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EARLY HUNTER - GATHERERS ADAPTATIONS IN THE TIRUPATI VALLEY

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INTRODUCTION

Studies in Prehistory of India date back to the last Century when Robert Bruce Foote discovered the first Palaeolith at Pallavaram near Madras in 1863. Subsequent collections made by Wyne in 1865 at Nungi-Pathan on the Godavari; ball in 1875 at four sites in Orrissa; Hackett in 1873 at Bhutra on the Narmada; and Cockburn in 1883 in the Singrauli basin in Uttar Pradesh (Sankalia 1974: 12) disclosed that Prehistoric cultures were wide spread in different geological zones in the country. The credit again goes to R.B.Foote who, as early as 1884-86 excavated (following the clues provided by Newbold in 1844) the Billa Surguma caves (Billa Soorgam) in the limestone country around Bethamcherla, Kurnool district Andhra Pradesh. The noteworthy feature of this work of Robert Bruce Foote (as a matter of fact his son Henry Bruce Foote completed the excavation) at the Billa Surgama caves was that, these excavations yielded bone artefacts, some of which Bruce Foote compared to the Magdalenian type of France, in association with late Pleistocene fauna. This was the first evidence of its kind in the Indian subcontinent limelighting evidence for the Upper Palaeolithic which unfortunately has not been thought of until the 1970s (Murty 1974). Credit also goes to Oldham (1864). King 1872), Sewell 1882), Moir (1909), Cockburn (1914), Cammidae and Burkitt (1930), Manely (1935) and Aiyappan (1943) for the discoveries of various cultures in the Prehistory of this region which now forms the State of Andhra Pradesh.

The pioneering work of Cammidae and Burkitt (1930), in the riverine zones of the Kurnool district for the first time

revealed four lithic industries in a stratigraphical and Palaeoclimatological context. These four industries labelled by them as series I (synonymous with Lower Palaeolithic), II (Middle Palaeolithic), III (Upper Palaeolithic) and IV (Mesolithic), though largely went unnoticed until the 1960s, represent the. foundation of the Prehistory of the southeast coast, That, the works of Cammidae and Burkitt was absolutely systamatic and documentary was conformed by Issac (1960) in Kurnool district, Murty (1966) in Chittoor district, Rao (1968) in Nalgonda district, Thimma Reddy (1968) in Cuddapah district, Sudersen (1976) in Nellore district, and Raju (1981) in Cuddapah district. A glance at these works, prove beyond doubt that the Southeast coast of India is one of the richest store houses of the Stone Age Cultures.

It is in this state of research, that I have concentrated in the Tirupati valley, (Chittoor district, Andhra Pradesh) the area of present study. It should be recalled that systamatic investigations of the Prehistory in Chittoor district started with the work of Murty (1962-63).

The Tirupati Valley (13°30' to 13°45 N: and 79°16' to 79°45' E) is a basin which lies between the Palakonda-Velikonda and Sanambatla-Srikalahasti and Nagari ranges of the Eastern ghats. Several river basins in the Eastern ghats right from the Gundlakamma in the middle (of these hill ranges) upto and beyond the Kortalier valley in Tamil Nadu are fabulously rich in Stone Age occupation sites belonging to Palaeolithic (Lower Middle and Upper) and Mesolithic. Coming back to the Tirupati Valley and its adjoining environments, a few Palaeolithic artefacts were found in southern part of Madanapalli as at "Bodigutta" (13°13' N: 78°31' E). Other important occurrences yeilding Palaeolithic period are "Aravandlapalli" (78°48'E) in Vayalpadu taluq. Appayegaripalli (13°40' N: and 78°42'E) and Agraharam. There are some occurences between Chittoor town and Bahuda river belonging to the Middle Palaeolithic. Chintaparthy, (13°46' N: and 78° 47' E) about eight km northeast to

the preceeding centre on the down stream of the river Bahuda has also yielded Middle Palaeolithic artefacts. Piler (13°38' N and 79°21'E) has yielded a few doubtful Lower Palaeolithic artefacts. The burried cliff section on both the banks of Swarnamuki river show a weathered red silt of about 1.5 to 0.2 m. From the loose gravels of these sections, a few Lower Palaeolithic implements were collected from Chandragiri area. Around Tirupati, as at (13°38' N: and 79°21' E) Alwar Tirtham nullah section has yielded eight Lower Palaeolithic artefacts (Murthy 1962–63). From the vicinity of kuppam (12°45' N and 79°22' E), the southwestern most tip of the district, a few Lower Palaeolithic artefacts were collected (Benerjee and Rao 1963–64). Chintamanu (13°21' N and 79°37' E) and Isukatagali (13°21' N and 79°37' E) and Srikalahasti (13°45 'N and 79°45' E) have Middle Palaeolithic artefacts (Benerjee and Singh 1968–69).

Against this background an extensive and systamatic research is carried out by me within the confines of the Tirupati Valley on a microgeographical level. Basing on these investigations and discoveries a few reports entitled 'A Note on Prehistoric cultural evidence from Tirupati' (1975:327); 'Prehistoric human life in Rayalaseema' (1976:23–22) ; 'Human life in the (Palakonda–Velikondas) the oldest basin of India (Palaeolithic and Mesolithic 1978a, 78b, 78c, 78d); 'An isolated Mesolithic occurance of Tirupati Valley' (1978e); 'An analysis of the Socio-economic organization of the Yanadis of Rayalaseema' (1979: 85–90); 'Early populations of Tirupati' (1980); 'Prehistoric Anthropology of a hill stream, Tirupati Valley, South India' (1980); 'A Partial report on Prehistoric Anthropology of Tirupati Valley, South India' (1981); 'Prehistoric Anthropology of Tirupati Airport area' (1981); Microlithic Centers of Tirupati Valley' (1981); 'Stratified occurence of Middle Palaeolethic Assamblage, Tirupati Valley, India' (1981); 'Succession of Palaeolithic cultures of Isukakalava, Tirupati' (1981): 'Ethnoarchaeology of the Yanadis, Tirupati Valley, India' (1981); 'Fossil and Stratigraphic break' Tirupati Valley, (1982) and 'The Yanadi: A Scheduled Tribe Southeast coastal area of Andhra Pradesh' (1982) are made from the study area.

The aim is to establish chronological sequence, the context of archaeological occurences, viz; surface scatters/stratigraphic location and the nature of settlement pattern. The archaeological investigations are supported by ethnographic studies of the primitive hunter-gatherers namely the Yanadis, extant in the Tirupati Valley, whose adaptations and subsistance stratagies provide analagies for predicting the early hunter-gathers life ways.

THE STUDY AREA

The physiographical region that forms the focus of present archaeological study is situated between 13°30' and 13°45' N and 79°16' and 79°45' E and is in Chittoor district of coastal Andhra Pradesh. This region is hereafter referred to as the Tirupati Valley. Tirupati, the famous pilgrimage centre in South India is situated at the foot of a picturesque range of hills known variously as 'Seshachala' 'Venkatachala' 'Balaji' and more popularly as Tirupati hills. The town of Tirupati nestles in the midst of an amphitheatre formed by this range of hills. These hills rise to a level of about 1104 m AMSL. Curves and loops of these hills give a serpentine appearance when seen from above, and in the pious imagination of devotees these hills are believed to be the body of the divine serpent '***Adisesha***' on whose body Lord Vishnu reposes. The seven hills of Tirupati are said to represent the seven hoods of '***Adisesha***'.

Tirupati town, easily accessible by road, rail and air, is about 140 km northwest of Madras. It is 13 km to the west of Renigunta railway junction which is on the Madras-Bombay section.

Legendary Importance

Tirupati is the most important pilgrimage centre dedicated to Sri Venkateswara (also known as Balaji, Venkanna and 'Lord of Seven Hills') to which lakhs of pilgrims from all over India pay visit throughout year. It is believed that Tirumala, where actually the temple is situated, was once part of Mount Meru. Legend has it that, as a result of a fight between Adi-

sesha and Vayu, the great mountain broke and fell to earth. Parvas declare that the hill is the dearest of Lord Vishnu and that one would benefit by a pilgrimage to Venkatachala.

Historical Importance

The great dynasties of the southern peninsula have paid their homage to this ancient shrine. The Palavas of Kanchipuram (9th century A.D.), Cholas of Tanjore (10th century), Pandyas of Madurai and the kings and chiefs of Vijayanagara (14th–15th century) were devotees of Lord Venkateswara and they viewed with each other in endowing the temple with rich offerings and benefactions.

It was during the Vijayanagara dynasty that the number of benefactions increased. After the decline of Vijayanagara dynasty, other nobles and chiefs from all parts of the country continued paying their homage and gifts to the temple. The Maharashtrian General Ranghoji Bhonsale visited the temple and set up a permanent endowment for the worship in the temple. He also offered to the deity valuable jewels including a great emerald which is still preserved in a box named after him. Among the later rulers who have endowed large benefactions are the rulers of Mysore and Gadwal in Hyderabad. In 1843 A.D., however, the East India Company divested itself of the direct management of non-christian places of worship and the control of the shrine of Sri Venkateswara with a number of estates was transferred to the head of Hathiramji Mutt at Tirumala, and for nearly a century, till 1933 A.D., the temple was under the administrative charge of the Mahant, the head of this Mutt.

The Tirumala-Tirupati Devastanams committee was entrusted with the power of administration and control through a commissioner by special Act in 1933.

By another enactment, Act XIX of 1951, the administration was entrusted to a Board of Trustees and an executive.

At present in addition to Board of Trustees,an executive Officer, who is an Indian Administrative Service official is deputed by the State Government to look after the administration (T.T.D. 1962 : 7-9).

The Valley

Chittoor district is divisible into two distinctphysiographical regions - southwest upland and northeast lowland. The lowland includes Chandragiri, Srikalahasti and parts of Putter and Venkatagiri taluks. The present study covers the lowland regions which, broadly speaking, forms the Tirupati Valley, the striking feature of the valley is that it is encircled by hill ranges which form a component of the Eastern hats.

In the northeast, from Chandragiri, Seshachalam hills stretch towards east. Beyond Tirupati, these hills take a turn towards northeast and taper into Velikondas. The Velikondas run further north towards Nellore on the east coast, On the southeastern fringes of Chandragiri, further south to Tirupati, Sanambatla hills are situated. These stretch parallel to Tirupati hills and also take a northeastern turn beyond Tiruchanur and run further northeast to merge with Nagari hills. Thus the above two parallel hill ranges from a crescent over 800 sq km area.

In fact, during pre-cambrian period, when parts of Chittoor, Cuddapah and Kurnool districts were under local sea' these two parallel hill ranges formed a single mass (Suryanarayana, 1976). Further, the region includes the hill ranges of Panapakam, Mungilipattu, Syamala, Nagapatla, Sanambatla, Puttur, Srikalahasti and Nagari hills intercepted by some more narrow valleys.

In contrast to the low lying valleys and slopes, there are five peaks which rise from 948 m to 1104 m AMSL. These are: (1) Narayanagiri (1104 m), (2) Kakulakonda (979 m), (3) Gantamandapam (976.5 m), (4) Muralaguntapeta (950 m) and (5) Gannerakula tippa (948 m).

The plains are constituted of soils intercepted by outcrops of granite and dyke rocks. The slope of the plains tend from Chandragiri towards Yerpedu, then widen towards Venkatagiri and Srikalahasti areas stretching out closer to Nellore on the east coast.

Geological Succession

The geological formations in the region under study comprise (1) Archeans, (2) Eparchean unconformity, (3) Puranas, and (4) Quarternery deposits.

(1) **Archeans :** The oldest Archean rocks in the Tirupati valley are the genisses. The Archeans are partly of basic Igneous origin and partly of unfossiliferrous sedimentary formation. They contain schists and quartzites which are traversed by (a) granites and (b) dolerite dykes.

(a) **Granites :** The area is included under undifferentiated rocks (Pascoe 1931; Krishnan 1951; Roy 1962). There are innumerable dyke rocks of considarable width and linear extent in the granites, Throughout the velley, granite occurs as bed rock in highly weathered state as at Tirumala-Tirupati Devastanams Dairy farm well and in relatively fresh state as at Kalyani dam water reservoir located to the northwest of Tirupati town. The granite rocks are grey in colour and are composed of smoky quartz, turbid felspar of dull lustre, and dark grains of hornblend. Under microscope the relative proportions of quartz microchinse and plagioclase show such a high variation that they may be classified as granites, quartz granites, adamallites and quartz gramodiorites (Reddy 1981). All these types of rocks are generally called granitic rocks only.

A few rock structures encountered in the study area are fresh granite rocks with fractures and joints. Apart from a number of vertical joints, these rocks show extensive development of horizontal jointing at places. This is conspicuous in the granite quarry at Ithepalle village. The predominent direc-

tion of joining is along northeast to east. The other important joint directions at Chandragiri Fort are along north, northwest and northeast.

(b) **Dyke rocks :** Granitic rocks are at places traversed by dyke rocks, which sometimes extend to a few kilometers. They tend almost in every direction (Anjanappa 1964), but the one extending in an east or east-north-east direction is most common. The fractured nature of dyke rock is exposed at Nagapatla spill way. Dyke rock, weathered as intensively as granitic rock is noticed in some wells as at Aodhra Pradesh Agricultural University well located to the west of Tirupati town. The composition of the dykes vary from pure dolerite to spidiolrite, the latter being an altered dolerite.

(2) **Veins :** Apart from dyke rocks, veins of quartz and pegmatite, with green epidote as an essential mineral, traverse the granite terrain along the predominant joint direction. Their width ranges from a few centimeters to a few meters weathering into tors and boulders. In certain places they are much kaoli. nised. The granite is made up of vitreous, colourless quartz, and white as well as pink felspar. The most common accessory is hornblend. Biotite is occasionally present (Reddy 1981).

(3) **Quartzose sandstones :** Overlying the granite with a distinct unconformity, are the quartzose sandstones. There is a local conglomerate zone varying in width from five to eighteen centimeters overlying the granite.

In the western part of the Chandragiri hill region, the quartzose sandstones overlie granites at an elevation of about 136 m AMSL.

The quartzose sandstones are massive and are made up of many layers with distinct bedding planes. The thickness of these regular layered beds vary from 0.25 to 3 meters, Some- times, however, these beds bulge out into lenticular masses up to a few meters in length and one meter in thickness occasional- ly occur as intercalations in quartzose layers. Irregular columnar

jointings are observed in the top layers in the north eastern slope of these quartzose rocks and a little below them, where exposed in sections, horizontal sheeting is quite common throughout the area, The quartzose sandstone is usually reddish brown in colour with lighter shades in the freshly exposed sections,

(4) **Quartzite shale bands:** The quartzite shales lie conformably over the quartzose sandstones. They are alternating bands of quartzites and shales. The thickness of an individual band varies from 20 to 120 cm. The bedding planes of these are slightly undulating though, on the whole, they show roughly the same amount of dip, namely 10° due northeast.

Vertical sections of these rocks are exposed near 3/1, 5/1 5/3 and 7 km on the new ghat road to the temple. The western extension of these rocks cannot be traced very much beyond the 7th km stone. It may be due to a thick cover of vegetation. A small hill stream flowing towards Kalyani dam cuts at the bottom shaley layer and exposes these bands to a length of a little more than one kilometer.

(5) **Intrusives:** A dolerite dyke about 20m in width and about 600m in length due east-north-east and east-south-west cuts through the granite and the overlying quartzite sandstones. The vertical contact between the dolarite and quartzose sandstones could be seen near the 9th km stone. The intrusive is obviously younger than the quartzose sandstones.

According to King (1878) there is a fault running from a little west of Tirupati to Karakambadi, a distance of about 15 km, the down throw side towards north. Hence it is possible that the greater inclination of the bed along the eastern direction and the change in strike is due to this fault.

Due to tectonic movements the hills which were submerged under the Pre-cambrian sea developed a fault lengthwise and moved apart (Suryanarayana 1976) leaving an area of about 800 sq km above 500 m AMSL in a valley.

has an east-west trend, and the line of unconformable junction is irregular.

The Basal Conglomerate

The basal conglomerate makes an interesting study. It occurs as a thin bed, like a shoestring, of 15 to 45 cm thickness, It forms the base of the quartzite that overlies the granite and dolerite. The conglomerate is totally absent where the granite presents a domical surface to the quartzite. It is thicker where the eroded surface of the granite is flat, and thickest at the hollows (Suryanarayana 1975 : 195).

The constituents of the conglomerate are variable in composition, size and shape. They are of the nature of both iligomiet and petroniet conglomerates.

The weathering of granite in the valley having taken place after the uplift of Cuddapah basin is a later phenomenon. The overlying quartzites and shales are highly jointed. This water having met the granite barrier beneath' flowed along the granite-quartzite contact. This brings about much wide-spread alteration, such as, Kaolinisation of granite pebbles, and the granite basement itself. The unconformable contact is exposed at several places in vertical cliffs because of faulting and, at places, removal of sedimentary cover. The weathering of granite is then due to atmospheric action of geologically recent times. The second ghat road to the temple runs along the granite which is at places highly weathered to several meters below the unconformable contact. The presence of weathered surface is often cited as an evidence of unconformity.

3. Puranas

The formation is of Cuddapah group. The rocks of this group are well developed in the district in general and the valley in particular. This group is devided into four series after king (1972) :

1.	Krishna series	2,000	Srisailam quartzites Kolamala shales Irlokonda Quartzites.
2.	Nallamallai Series	3,400	Cumbum shales Bairenkonda Quatrzites.
3.	Cheyyair series	10,000	Tadipatri shales Pulivendala quartzites
4.	Papagni series	4,500	Vempalle dolorites mud stones Guvvala-cheruvu quartzites.

Even though the occurrence of all the four is found in the district, the valley represents the last two only. Their principal characteristics are as follows:

Papagni series

The Papagni series is named after the river in the gorge (Gandi) of which they are best exposed on the western fringes of Tirumala hills. This group consists of two stages, the lower one called Guvvalacheruvu and the upper one called Vempalle. The Guvvalacheruvu consists of conglomerates, quartzites, and sandstones with their intercalations of shales. They are grey, red buff and dirty white in colour. They are fine to coarse grained, sometimes flaggery, and gritty. The sandstones are generally quartzitic and contain pebbles of jasper and veins of quartz derived from the Dharwarian (Krishnan 1956). At the type locality near Guvvalacheruvu they attain a maximum width of 6 to 8 km.

The Vempalle stage consists mainly of dolomites of different colour and mudstones and also layers of rocks belonging to crypto-crystalline group. They are well exposed in the vicinity of Renigunta and also through to Kodur and Cuddapah. The hills of this region are composed of these rocks and have rounded tops because of the action of different weathering

agents. They contain the veins of barytes towards northwest to Renigunta and Kodur.

Cheyyair series

This series, named after the river of the same name, is well exposed along the Cheyyair river in the district. It is well developed in two areas, (1) Penner valley on the northwest and (2) Cheyyair valley on the northeast of the district.

The lower divisions of the series called Pulivendala consist of quartzites, sandstones, grits, flags, pebbly beds and conglomerates. The pebbles and conglomerates are to some extent derived from the chert bands of Vempalle formations (Krishnan 1956). Shale formations are well represented in Karakambadi, Papanaidupeta and Merlapaka areas of the valley.

The upper division in the northwest is called the "Tadipatri stage". This forms a thick sequence in which shales predominate with thin strata of silicious limestone chert, jasper and intrusive basic slates. Among these, chert and slate bands occur in a sizable proportion between Renigunta and Yerpedu. The limestone is found to occur under the quartzites of Seshachalams towards north of Tirumala.

4. Quaternary deposits

The quaternary deposits of the valley consist of ancient alluvium and subrecent fluvial deposits.

The ancient alluvium is the most common geomorphic feature in the region. It comprises basal gravels overlain by red silt, and red sandy loams. The basal gravel are observed forming the bottom most coarse deposits in all the river systems. In some exposed sections of the Rallakalava river, granite bed rock weathered to grit, is present below the basel gavels. Similarly, in a section of Merlapaka, exposed by a hill stream, weathered granite grit is at present below the basal level. The

ancient alluvium forms extensive terraces on either bank of the rivers.

Laid against the ancient alluvial terraces are relatively younger deposits which comprise finer gravel (second gravel) and yellow silt. This second cycle of deposits belong to a depositional phase and can be called the 2nd terrace. Archaeologically, the basal gravel yields rolled Lower Palaeolithic artefacts. On top of red sandy loams occur workshops of late Acheulian culture. Middle Palaeolithic artiefacts occur in association with fine gravels or, in a primary context on the ancient alluvial surface. Similar are the occurrence of Upper Palaeolithic and Mesolithic artefacts.

At the Stone Age Sites at Rallakalava, Isukakalava, Guravarajupalle and Tirupati airport, calcarious gravel and gritty ferruginous gravel occur on top of weathered granitic bed, sometimes in accociation with red sandy loam.

Drainage Pattern

The valley is drained by the Swarnamukhi river and its tributaries which flow in northeastern direction in to the Bay of Bengal.

The important tributaries of the river in the area are: (1) Kalyani, (2) Bhima, (1) Dosallavanka, (4) Nagapatlavanka, (5) Jarlakona, (6) Isukakalava, (7) Vankakalava, (8) Ralla kalava (9) Konamadugu, and (10) Vempedu river.

Kalyahi : Kalyani is a hill stream having its origin in the Syamala ranges of Seshachalam hills. After receiving water from a number of rivulets, it flows in an easterly direction and joins the Swarnamukhi river at Kalur village. A net work of streams feed the Kalyani. The streams are : (i) Saddikudu vanka, (ii) Kukkala kona vanka, (iii) Anupa vanka, (iv) Ragimanu vanka, (v) Mamidimanu vanka, (vi) Pagadagundla vanka, (vii) Tumbur kona, (viii) Tellabandla kona and (ix) chintagunta vanka. All these "vankas" (small streams) and "konas"

(small hill streams) rise in the southwestern vicinity of Tirumala temple and flow into the Kalyani.

Bhima : The Bhima river rises in the west of Chandragiri in the palakonda hill ranges and takes its course in easterly direction to join the Swarnamukhi at Kotala village.

Dosalla vanka : Dosalla vanka rises from the hill slopes of the Sanambatla Reserved Forest. It flows in an easterly direction to drain into the Swarnamukhi to the east of Chandragiri town.

Nagapatla Vanka : A number of runnels from Nagapatla Reserved Forest put together are known as Nagapatla vanka where it flows across the plains of Srivarimettu village before joining the Swarnamukhi river.

Jarlākonā : Jarlakona is a small hill stream which rises from Tirupati hills and flows towards the east to join the Isukakalava to the southwest of Renigunta.

Isukākalava : Isukakalava originates at the northeastern foot of Tirupati hills. Its origin and course through the hilly tract are almost parallel to those of the Rallakalava. It joins the Rallakalava about 3 km north to Renigunta.

Rallakalava : Rallakalava is also a hill stream arising in Tirupati hills near Avacharikona. After flowing through a hilly tract, it flows across a level plain and flows down towards the Swarnamukhi and joins it to the east of the airport.

Vankakālava : It is a narrow but perennial stream which rises from Vadamalapeta hill ranges. It flows in a northwesterly direction towards the Swarnamukhi and opens to the west of Papanaidupeta village. It drains whole of the area surrounding Vadamalapeta and Renigunta.

Konamadugu: Konamadugu, a hill stream rises from the vicinity of Akka Devatalakona in the Velikondas. After flowing through a narrow valley, in a curved tract, it opens into wider

plains and immediately loses its identity by joining the Rallakalava.

Vempedu River : Vempedu river originates from the Velikondas. It is the major drainage source for the whole of the plains of Yerpedu and Srikalahasti. After a short north-easterly course in the northern plains of Merlapaka lake, it joins the Swarnamukhi river midway between Yerpedu and Srikalahasti.

The majority of the hill streams are found to have subterranean drainage into lakes. Such lakes are innumerable between Renigunta and Yerpedu. Hence Renigunta-Yerpedu area enjoys drainage round an year.

Springs (Tel. "Bugga")

There are seven important springs viz., (1) Akasaganga (2) Papavinasam, (3) Akka Devatalakona, (4) Marrimakula Kona (5) Vankakalava Kona, (6) Bugga Kona, and (7) Sitarampeta Kona. The first two springs are found in Seshachalam or Tirupati hills while the rest (excepting Vankakalava) are located in the Velikondas. Vankakalava rises in Nagari hills.

Lakes (Tel. "Ceruvu" or "Kunta")

There are as many as 136 lakes ranging between 250 sq m (Manchineellakunta) to 2 sq km (Rayalacheruvu) in dimension. These lakes are major sources of irrigation in this area. Though the lakes are of natural origin, they have been bunded in view of agricultural use, probably during early historic times. Quite a few of them have water round an year because they have subterranean drainage from the nearby hill ranges such as (1) Nagapatla, (2) Panapakkam, (3) Dornakambala, (4) Papanaidupeta, (5) Sitarampeta, (6) Mallemadugu, and (7) Anjamedu Cheruvu.

Waterfalls

There are also waterfalls, both seasonal and perennial. The perennial ones are found in the midst of Tirupati hills.

There are three small waterfalls viz., (1) Akasaganga, (2) Papavinasamteertham (both in Tirupati hills near Sri Venkateswara Shrine) and (3) Kapilateertham (at the foot of these hills in the northern vicinity of Tirupati town, where there is a shrine of Siva).

Tirupati hills and its intra-drainage

The water from Narayanagiri watershed drains into Chakrateerthamu vagu, which joins Avacharikona vagu, the source for the origin of Rallakalava.

The Kothakona water shed drains into Bodeddula vanka. Similarly, the water from Utlakona drains into Ippakona vanka Both these vankas flow towards northeast of the hill to emerge as Isukakalava.

The water from Tiruraipenta watershed drains into Saddikudu vanka which is one of the rivulets of the Kalyani.

Similarly the water from Japalateertham and Akasaganga watershed flows down the southern slopes of the hills to join Kapilateertham. Thus, all these feeders and streams of the hill ranges contribute to the drainage pattern of the Swarnamukhi river.

Climate.

The annual climatic cycle consists of four seasons. The three months from December to February are comparatively cool and dry. The summer from March to May is followed by the southwest monsoon from June to September. The postmonsoon season ranges from October to November/December. In general, the climate is hot and semi-arid. The monthly minimum maximum and mean temperatures are 12.50° C, 44.2° C and 27.5° C, respectively.

Rainfall

The mean annual rainfall in the valley is 872 mm. The rainfall generally increases from the valley to Tirumala hilltops.

The northwestern part of the Tirumala hills, closest to Kalyani dam, receives rainfall renging from 673 to 1077 mm. It is mostly experienced between the months of July to November. The heaviest rainfall occurs generally during October-November. However, it may vary from year to year. During the last 79 years from 1901 to 1980 the highest rainfall was 1690.6 mm and the lowest was 400.8 mm. The rainfall for the last 79 years shows that no two consecutive decades enjoyed similar rainfall.

Temperature

The winter season from the fag end of November to the onset of February forms the coolest part of the year. The data of temperature from 1967 to 1977 shows normally December as the coolest (21.56°C _ 1969) month and May as the hotest (41.19°C – 1974) with the average temperature about 33°C. From the middle of February it gradually rises while from the middle of August it falls. The weather is very oppressive during summer but less so in winter.

Humidity

The humidity ranges from 21% to 91% with a mean of 50%. It is generally high from September to December. The predominant wind direction is east during north-west monsoon and west during north–east monsoon.

The sunshine hours range from 10.7 to 3.8 with an average of 7.6 hours. The computed daily evaporation by pan method ranges from 2.4 to 11.3 mm with an average of 5.2 mm. Maximum evaporation is noted in April while it is minimum in December. The computed mean yearly evaporation is 194 cm.

Cloudiness

From about the end of May to the beginning of December, the skies are generally clouded particularly on the top of the hills. During the rest of the year the sky is moderate to heavy though gales are often experienced in the coastal region.

There are three small waterfalls viz., (1) Akasaganga, (2) Papavinasamteertham (both in Tirupati hills near Sri Venkateswara Shrine) and (3) Kapilateertham (at the foot of these hills in the northern vicinity of Tirupati town, where there is a shrine of Siva).

Tirupati hills and its intra-drainage

The water from Narayanagiri watershed drains into Chakrateerthamu vagu, which joins Avacharikona vagu, the source for the origin of Rallakalava.

The Kothakona water shed drains into Bodeddula vanka. Similarly, the water from Utlakona drains into Ippakona vanka Both these vankas flow towards northeast of the hill to emerge as Isukakalava.

The water from Tiruraipenta watershed drains into Saddikudu vanka which is one of the rivulets of the Kalyani.

Similarly the water from Japalateertham and Akasaganga watershed flows down the southern slopes of the hills to join Kapilateertham. Thus, all these feeders and streams of the hill ranges contribute to the drainage pattern of the Swarnamukhi river.

Climate.

The annual climatic cycle consists of four seasons. The three months from December to February are comparatively cool and dry. The summer from March to May is followed by the southwest monsoon from June to September. The postmonsoon season ranges from October to November/December. In general, the climate is hot and semi-arid. The monthly minimum maximum and mean temperatures are 12.50° C, 44.2° C and 27.5° C, respectively.

Rainfall

The mean annual rainfall in the valley is 872 mm. The rainfall generally increases from the valley to Tirumala hilltops.

The northwestern part of the Tirumala hills, closest to Kalyani dam, receives rainfall renging from 673 to 1077 mm. It is mostly experienced between the months of July to November. The heaviest rainfall occurs generally during October-November. However, it may vary from year to year. During the last 79 years from 1901 to 1980 the highest rainfall was 1690.6 mm and the lowest was 400.8 mm. The rainfall for the last 79 years shows that no two consecutive decades enjoyed similar rainfall.

Temperature

The winter season from the fag end of November to the onset of February forms the coolest part of the year. The data of temperature from 1967 to 1977 shows normally December as the coolest (21.56°C _ 1969) month and May as the hotest (41.19°C - 1974) with the average temperature about 33°C. From the middle of February it gradually rises while from the middle of August it falls. The weather is very oppressive during summer but less so in winter.

Humidity

The humidity ranges from 21% to 91% with a mean of 50%. It is generally high from September to December. The predominant wind direction is east during north-west monsoon and west during north–east monsoon.

The sunshine hours range from 10.7 to 3.8 with an average of 7.6 hours. The computed daily evaporation by pan method ranges from 2.4 to 11.3 mm with an average of 5.2 mm. Maximum evaporation is noted in April while it is minimum in December. The computed mean yearly evaporation is 194 cm.

Cloudiness

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Flora

The forest of the district is of a dry deciduous type. the considerable variation in the condition and density of floristic distribution is due to factors like altitude, soil type, and the amount of rainfall they receive. Until the second half of the seventeenth century, these forests were rich enough to sustain wild elephants (Lakshmipathy n. d. 390).

The average height of large tree crop ranges from 8 to 10 meters and the girth is below a meter. In the valley and the hill ranges encircling Seshachalam, Palakonda, Velikonda, Sanambatla Reserve Forest, Nagari Reserve Forest and Srikalahasti, the rainfall is strikingly high, thus supporting more dense and extensive crop.

Red sanders *(Pretocarpous santalinus)* occurs as one of the richest crops. This is the main source of red sanders in the whole of the Eastern ghats.

The floristic abundance is devided into three primary ones based on the elevation and the importance, species of plants that occur in that elevation are :

1. Terai or Fuel forest upto 244 m elevation,
2. Hill forests or red sanders between 245 and 610 m elevation and
3. *Shorea eugenia* species occupying above 611 m elevation.

The important species of plants of these three zones are as follows :

1. The Terai and Fuel forests

The peripheral occurances of the Terai forests, easily accessible to people inhabiting them contain thorny species. Quite in the interior of the Terai zone, thorny species tend to disappear and non–thorny species appear. These are

clearly observed at the northeastern slopes of Tirupati hill ranges towards Renigunta and Yerpedu.

2. *The Anogeissus latifolia :* It occurs above the Hardwicks zone. It is primarily used as timber for posts, beams and rafters and also as fuel. The species is highly sensitive to drought.

3. *The Petrocarpous santalinus :* This zone succeeds the Anogeissus inclination. It shows highest density of the evergreen species even from loops of the old ghat road to the Tirumala temple towards Renigunta and Karakambadi. Similar occurences is found near Yerpedu and Sitarampeta gorges.

III. Shorea-Eugenia zone

The occurence of this zone is quite widespread at the hill tops above the escarpment on the Seshachlam hills, and at similar elevations on all the hill ranges. It constitutes 85% of the crop among these hills. The most significant among the crops of this zone are : *Phoenix sylvestries* (ita): and *Cycas circinalis* (Pericita). The e are noticed even from a distance and they form a part of the seasonal fruits to the local inhabitants.

Fauna

The important wild species found in the forests belong to Class mammalia orders Primate, Carnivora Rodentia Artiodactyla. Class Reptelia including Rare or extinct sps.

Out of these wild species, the most common and important of Small game are: about ten species and (ii) Big game are : four species.

Most of the small game animals are found in the scrub Jungle with thorny thickets. The big game animals found in the hyatic ranges are – Shorea – Eugenia and red sanders zone.

The *Panthera pardus* is found in small numbers in the Seshachalam - Palakonda Velikondas. The *Harpestes edwardsi* the *Canis aureus*, the *Vulpes bengalensis* commoly found in

all the hill ranges. The *Sus scrofa* is mostly confined to rocky hills as found in Chandragiri area to the west of Seshachalam. The *Ratufa indica* occurs in these hill ranges specilly on hilly zones beyond Papavinasam towards Balepalli. The *Hystrix indica* and the *Lepus niqricollis* occur in all the forests all over the hill ranges They occur in high concentration towards Konamadugu gorge. The species of *Gazelle* are reported from Nagari and Srikalahasti hill ranges towards down south. *Cervus uniqolor* are plenty in the valley area. *Axix axis* is quite common along the perennial water sources. So at almost all the hill streams, ponds and lakes these species appear very often.

PEOPLE

According to the latest available figures (Census 1981) the total populations of the district is 19,14,639. The distribution of population among the various taluks has been consistently uneven as can be judged from the wide spectrum of figures between Puttur taluk and in the lowland (of the study area) and kuppam taluk in the upland of the district.

In 1961, Puttur led the other taluks with a total population of 2,46,446. The density of population in the district per square 1,600 meters is 328 as against the state figures of 339.

The important aspect of the population pattern is its distribution among the various religious groups. The Hiudus who number 17,53,157 constitute the bulk of the population with the Muslims (1,39,015) and the Christians (22,386) coming as a distant second and third (Gazetteer (1979) groups.

Urban and Rural

There are 1,558 revenue villages in the districts. Of these, 1,429 are inhabited accounting for 89 persent of the total population. The population of the dominant type of village is between 1,000 and 1,999 persons. The urban area consists of 13 towns, among which Tirupati, Tirumala and Renigunta are

found. Thus after this nature of villages, the major region of the study area falls within rural background.

In addition to cast populations the Tirupati valley includes a number of scheduled tribes. Among the extant tribes, the Yanadis show numerical domination not only in the district but on the state level also and male to female proportion they occupy a position next to Koyas. However, within the south-east costal districts, comparison between total cast population and other tribal population are made, the Yanadis are in high proportion. Similar trend is observed between the Yanadis and the other state leve populations. In view of such predominent rural nature, numerical significance and the confeinement of the Yanadi tribe to the southeast coastal region, the habitational area of this tribe, the extent available geographical area forests etc., are presented. A detailed account of the Yanadis is presented in the chapters to follow.

STUDY AREA

The present study is confined to the Tirupati Valley in the Swarnamukhi river basin. The Swarnamukhi river originates in the Adineyapalli reserved forests at 750 m AMSL. The river has a course of about 65 km in between Palakonda, Velikonda and Sanambatla, Nagari as well Srikalahasti hill ranges. During this course it is joined by a number of tributaries and ultimately debounches in to the Bay of Bengal.

Aim

The work aims at a reconstruction of the Palaeolithic and mesolithic cultural evolution in the valley with the help of location and distribution of Palaeolithic and Mesolithic sites against their topographical setting, drainage pattern, raw meterial, resources, flora and fauna, Analogies from the subsistence strategies and cultural parallels of the primitive Yanadi tribe living at and around these sites are drawn to reconstruct Stone Age presently referred to as early adaptations.

Methodology

Explorations for locating Stone Age sites were carried out along the foot hills, streams, lakes and the plains. Polaeolithic and Mesolithic sites located in the area are mapped according to their topographical location and distribution.

Stone Age cultural meterial is analysed in terms of latest typo-technological methods. This is presented quantitatively and qualitatively by resorting to discriptive, statistical and graphic presentations.

Based on the occurance of Stone Age artefacts, at foot hills, along lakes and streams and in the plains, occupational areas were devided into several loci. Extent of artefactual occurence, density and distance between sites were taken into consideration deviding each locus into several scatters, in case of surface occurences. They are called trenches in case of trial pit excavations. Each locus, or scatter or trench was devided into several square meters. The artefacts were collected from selected square meters of average density at random.

Functions are attributed and assigned to some specific tool types on documentary ethnographic evidence (Mulvaney, 1976 : 76–84) and experimental results used in micro wear analysis of stone tools in other parts of the world (Keeley, 1979 : 102–109). It is necessary first to relate stone tools to human activities and then to determine how these tools were distributed at different sites in order to assess the relevance for palaeolithic hunter-gatherers (Binford and Binford 1969 : 94-95). It is presumed that the variability in the distribution of stone tools show the variability in human activities.

Ethnographic analogy has been used for the reconstruction of Stone Age hunter-gatherer economy. Data on the ethnography of the Yanadis in general and the Challa Yanadis in particular was collected by the following methods :

1. Interviewing the Manchi and Challa Yanadis, particularly the aged and experienced in hunting and gathering activities.

2. Participant observation in fishing and hunting gathering expeditions of the Challa Yanadis to collect firsthand information on their subsistence strategies.

3. Documentary evidence such as census reports, district gazetteers. district manuals, hand books and statistical abstracts are used for interpretation. Information has also been drawn from published and unpublished regional ethnographic monographs and field reports on the Yanadis.

Sites and Stratigraphy

Explorations conducted in the Tirupati Valley brought to light sites ranging from Lower Palaeolithic to Mesolithic periods. These occur both on the surface and in a stratified context. The sites can be distinguished as (i) foothill sites, (ii) lake side sites, (iii) streamside sites, (iv) hillslope sites and (v) plainland sites.

i. Foothill Sites

The foothill sites are characterized by only Lower Palaeolithic occurences Heavy concentrations of these have been found in the form of occupation scatters all along the foothills. This belt of Lower Palaeolithic occupation stretches from Tirupati township towards the Kalyani water reservoir covering an area of 2×12 sq km. The vegitation along the foothili zone is characteristic of a scrub savanna types. Since this foothill zone has a red sandy loam cover and large quantities of boulders and cobbles, it is not suitable for agriculture; it is relatively undisturbed. Even making an allowance for some destruction of the flora by either grazing or felling of trees during the present times, it can be inferred that the landscape during Acheulian occupation was not much different from that which can be seen today. At the most, there could have been some more dry deciduous trees. Exposures of quartzite are common in the foothill zone. The scrub savanna vegetation, exposures of quartzite for raw meterial and perennial water pools

might have provided ideal niches for the Acheulian hunter-gatherers. This explains the density of Acheulian in the foot-hills. It is interesting to note that all the Lower Palaeolithic foothill occurrences are located at 167 m AMSL. Another characteristic feature is that these are located in close proximity to the natural perinnial ponds which also receive discharge, during monsoon, from the erosional gullies running down the foothills. Further all these ponds ranging from 30×25 m to 100×160 m in dimensions do not go dry even in summer (though the water level decreases) as they are all connected by a sub-terranean drainage system.

In those occurences which have suffered the action of erosional guallies, the artefacts occur stratified in the talus deposits. At these stratified spots, the arterfacts are exclusi-vely of Lower Palaeolithic technological tradition, and these assemblages provide type examples to distinguish Lower Palaeolithic at the surficial localities in the valley, where occurrences of more than one cultural period are present. Taking into account the saliet feature of these occurrences loca-ted at 167 m AMSL each occurence is treated as a locus as shown below.

I. I. Locus 1

At locus 1 now stands the Sri Venkateswara Medical College. This is close to Alipiri, a part of the Anjanadri which is the first and lowest of the seven hills and the gateway for both pedestrians and motor vehicles to reach the shrine of Sri Venkateswara on the top of the seventh hill, the Venkatadri.

Observations made during the excavations in 1974 for the foundation of staff quarters revealed the following stratigraphy

(from bottom towards top).

Layer	Thickness (in mm)	Nature of deposit	Cultural assemblage
1.	150	Pebby gravel	Acheulian
2.	100	Red loam	—
3.	Surface	pellety leteritic gravel	

This is a factory-cum-living site. Handaxes, cleavers, discoids, choppers, scrappers and flakes belonging to late Acheulian occur *in situ* in the pebbly gravel. Extensive digging for construction work turned loose several artefacts all over this locality indicating extensive occupation. All the artefacts are in mint condition though with a reddish patination, indicating that they occur in a primary context, though some of them suffered slight displacement by the action of erosional gullies.

1. 2. Locus 2

This locus is situated about 30 m south of the Sri Venkateswara Arts College, which is about one kilometer southwest from locus I. I. During levelling for playground Lower Palaeolithic artefacts were exposed from the pebbly gravel horizon, which as at locus I. I. underlines the red loams. The artefacts are discoids, handaxes, cleavers, choppers, flakes and cores and are also in a primary context and show the same state of preservation as at locus I. I. The artefact concentration is moderate.

1. 3. Locus 3

This is to the 250 m west of locus 2, where the Sri Venkateswara University College is now located. Within this locus, which covers approximately one sq. kilometer, a number of surface scatters were recorded in the present study, five scat-

ters are-now considerend. The tool types are handaxes, cleavers, large quantity of flakes of late Acheulian character and debitage The artefacts which are in a primary context are fresh and in mint condition. The five surficial scatters, each separated by a distance of about 300 m are as follows:

Scatter 1: This scatter lies between the main building of the University college, and A Block: boys' hostel. It measures about 12 sq. m. The artefacts are exposed on the surface and show a high frequency of flakes. The high occurence of flakes suggest hat the scatter was a working floor.

Scatter 2 : The scatter now is in the University Girls' hostel garden. It measures about 25 sq.m. The features of this scatter are the same as those of scatter 1.

Scatter 3: This covers about 20 sq. m. and is located in front of the University Library building. Among the finished artefacts handaxes stand next to flakes in percentage. Cores are also quite common.

Scatter 4: This scatter is located about 250 m northwest to the preceding scatter to the north of the Arts Block building. The scatter measures about 15 sq.m. and shows flakes and cores, as the major components.

Scatter 5: This occurs on the extreme northern side of the University Campus in front of the Correspondence course building. This is exposed in the water diversion dug out towards the southwest of the campes. a number of handaxes, choppers, cores and large quantities of flakes are collected from the exposed sections and the dug out material.

1. 4. Locus 4

This is on the southern fringe of the Univesity campus, where Sri Padmavathi Women's College is situated. A section of a nullah on the northeast of this campus shows the following stratigraphy from bottom towards top.

Layer	Thickness (in cm)	Nature of deposit	Culture
1.	180	Pebbly gravel	Acheulian
2.	200	Brown soil	-
3.	20	Concretionary	–

Scraping of the section in the erosional gullies of this nullah has yielded handaxes, cleavers, choppers, flakes and cores from the pebbly gravel. Artefacts occuring at the basal part of the pebbly gravel are weathered as a result of contact with the gritty granitic surface.

1.5. Locus 5

On the northwestern side of this locus is the T. T. D. Dairy farm. The stratigraphy of well dug here has revealed a 14 m thick section from granite bed rock upwards. The bottom most layer is a pebbly gravel (pebbly gravel I) of 2 m thickness. Overlying this pebbly gravel on the western side of the section is a murrum layer which is 0 75 cm to 1.00 m in thickness. This murrum is sealed by a 1.5 m thick layer of black clay. Next in suquence is a second pebbly layer (Pebbly gravel II) of about 2.5 m thickness with an intercalation of kankar. Overlying this pebbly gravel II is a 4.0 m thick layer of yellowish calcarious clay. This is capped by 2.5m dark yellowish stiff clay succeeded by red loam.

Acheulian artefacts, rolled and weathered. occur in pebbly gravel I. The pebbly gravel II has also yielded Acheulian artefacts, but the latter are technologically superior.

1.6. Locus 6

A surficial scatter of about 45 sq m on a red sandy loam forms this locus. This is about 200m north of Pudipatla village, and 4 km southwest of the preceeding locus. Handaxes, choppers, cores and flakes form the primary components. The

artefacts are patinated due to constant contact with weathered granitic bed rock.

1. 7. Locus 7

This is on the Sanambatla hillslope. Handaxes, choppers and flakes in moderate concentration are scattered along the hillslope towards the Swarnamukhi river. Artefacts also occur stratified in the sections of erosional gullies of the nullahs. The artefacts are fresh and are in mint condition.

II. Lakeside and Streamside sites

Occurrence of a number of lakes and hillstreams is a characteristic feature of the valley. The lakes range from 5 sq m to about 250 sq km in area. The lakes are situated away from the foothills and are closer to the Swarnamukhi river. These lakes are natural and some of them are bunded for irrigation from early historic times They are fed by rain as well as spring sources and form a part of the drainage network of the Swarnamukhi basin. These (lakes and streams) are conspicuous between Renigunta and Yerpedu, where there is a natural pass between the Palakonda- Velikondas at a low level of 106 m AMSL in contrast to the general elevation of 1000 m AMSL of the Palakonda Velikonda–Rajampet–Rapur chain of the Eastern ghats. The low lying plains withe lakes and streams, are characterized by a discontinuous thorny thicket zone which, as the elevation rises towards the higher peaks develops into a scrub woodland and woodland zones respectively. This vegetation pattern can be clearly noticed at Avacharikona, Konamadugu, Sitarampeta and Yerpedu gorges. These regions have exposures both coarse grained and finegrained quartzites, which are also available in the form of cobbles and pebbles in the area. The cobbles and pebbles formed the predominant sources of raw mateials from Acheulian to Upper Palaeolithic times in these zones. Artefactual scatters occurring right on the granitic surface without any displacement, as well as on the ancient alluvial terraces of Ralla Kalava, Konamadugu, Isukakalava and Vankakalava in a primary context, as well as in the river channels (though in a

rolled conditions) prove that these ecotomes formed favoured habitats from Acheulian to the Mesolithic times.

Lakeside sites

11. 1. Locus 1

Close to Igitimala lake on a ferruginous pellety surface measuring about 60 sq m is an Acheulian occurrence comprising handaxes, cleavers, and choppers. About 15 m away from this is another occurence of predominently scrapers, notched flakes, and diminutive handaxes. The assemblage discloses Middle Palaeolithic tradtion with the survival of Late Acheulian tradition. The raw material for Middle palaeolithic is medium-grained quartzite while the Acheluian is on coarse-grained quartzite. TheMiddle Palaeolithic artefats like those of the late Acheulian period are in mint condition but they are less patinated.

11. 2 Locus 2

A widely spread surficial occurence of both late Acheulian and Middle Palaeolithic, occurs at separate spots on loose brown lateritic gravel. This is located at a distance of about 500m from Vadamalapet lake which is to the south.

This lake receives discharge from a hillstream coming down the Nagaris, and it is fed by subterranean springs as well. The section of Swarnamuki river near Vadamalapeta village on the west is a typical stratigraphic section of this area.

In the Swarnamuki section, Acheulian artefacts occur on the top of the granitic bed rock mixed with ferruginous pellets. The Middle Palaeolithic flake assemblage is not found in the section but occurs only on the surface.

II. 3. Locus 3

About 3 km east of the preceding locus are Late Acheulian and Middle Palaeolithic loci close to a perennial lake near Gajulamandyam village. The artefacts are patinated to pale yellow colour.

II. 4. Locus 4

A number of Acheulian and Middle Palaeolilhic scatters are found on the northern part of the Karakambadi village lake. These surficial scatters occur on elevated grounds in gravel spreads which also consist of loose ferruginous pellets. The raw material used is coarse-grained quartzite in the case of Late Acheulian and is medium to fine-grained quartzite of yellowish-green colour in the case of Middle Palaeolithic. They are fresh and occur in primary context. A few artefacts embedded in the soil are patinated.

II.5. Locus 5

Late Acheulian and Middle Palaeolithic loci are found on the western side of Papanaidupeta lake, the largest of the area. The locus is on the pellety gravel surface lying between the two hillstreams which open into this lake. This lake is alwyas full and never goes dry, though the water level falls in summer. While the Acheulian artefacts are recovered from a nala section from the pebbly gravel resting on the bed rock, which in turn is overlaid by red silt, the Middle Palaeolithic artefacts are found on the surface. Along with the Middle Palaeolithic flakes and flake tools, large quantities of worked nodules and chips, on medium to fine grained quartzite are encountered.

Stream side sites

II.6. Locus 6

An extensive late Acheulian cluster consisting of hand-axes, cleavers, cores and flakes and another cluster of Middle Palaeolithic about 50 m on the west are found near Venkakalava, a perennial stream which rises from Nagari hills, drains towards the plains and flows by the side of Papanaidupeta village. The artefacts are fresh and to some extent disturbed.

II.7. Locus 7

This locus is situated on ferruginous gravel measuring about 150 sq m between Sitarampet and Venkatapuram lakes. Sitrampeta and Venkatapuram villages are situated on the right

of Tirupati-Nellore bus road, about 15 km northeast of Renigunta. Middle Palaeolithic flakes and flake tools are found scattered over this gravel. In addition to surface collection, trial trench excavations are made at relatively undisturbed area of 3'×2' with a view to assessing statigraphic occurence, nature of distribution and technological variation.

II.8. Locus 8

The whole of the area situated on the northern side of the Tirupati airport, drained by the Isukakalava-Rallakalava presents a badland topography as it has been dissected by the number of gullies and nullahs. So a number of palaeolithic scatters have been exposed over a square kilometer. The two lakes measuring about 1.00 sq km each situated on eastern and southern borders of the airport drain the region, This is rich in surficial scatters which belong to Lower and Middle Palaeolithic periods. The artefact assemblages in these scatters occur as clusters, and are not much disturbed except by the surface run offs of seasonal freshets.

The Lower Palaeolithic assemblage comprises late Archelian forms such as choppers, handaxes of different types, cleavers, scrapers, massive flakes showing edge damage and quantities of debitage. The raw meterial is medium-grained brown-coloured quartzite. The artefacts, which occur on gritty surface of weathered granite, show creamy white patina·

The Middle Palaeolithic assemblage comprises predominantly scrapers, miniature bifaces, irregularly flaked chunks of quartzite, used flakes and prepared cores. These are predominantly on fine-grained quartzite though on medium-grained quartzite make an impressive percentage. A noteworthy feature of Middle Palaeolithic also occur – shouldered, tanged (a few) and Levallous points.

The Palaeolithic scatters range from one to eight square meters in size. From such varied scatters, only five scatters which represent average dimensions and density of aftefacts both

Lower and Middle Palaeolithic base-cum-work camps, are considered as follows :

Several scatters occur all around the area, the land mark of which is the present airport, close to the downstream course of Rallakalava. The total areas is characterized by cobble (and to a small extent gravels) spread resting on the calcareous sandy loams mixed with highly weathered granitic grit in which at places are embedded reverine pebbles derived from the hills-treams. This deposit in thickness varies from a minimum of 0.30 cm to 2.0 m towards the course of Rallakalava - Kona-madugu; these formations are mixed with red silt and in the total area there are exposures of granitic bed rock. The vegetation is only of grasses with no tree cover, but occasional scrub. The hallmark of this region is the presence of several Lower and Middle Palaeolithic scatters occuring in small clusters, which are evidently activity loci. The precise nature of these can only be determined by edge wear studies of the respective artefacts in each cluster. Details on artefact collection from these scatters are taken into consideration from three different loci of late Acheulian and two loci of middle Palaeolithic.

II. 9. Locus 9

All along on the right bank of Isukakalava occur surficial scatters of Upper Palaeolithic and Mosolithic times predominantly.

A stratified section of the right bank, facing northwest to Renigunta check-post, shows the following layers from bottom towards top :

Layer	Thickness (in cm)	Nature of deposit	Culture
1	150	Mottled clay	—
2	80	Pebbly gravel'	Acheulian
3	130	Silt	—

In the gravel area, within the erosinal gullies or in the nullah sections' occures a thin second gravel horizon comprising loose and angular medium-sized cobbles. This occurs either on the brown soil or directly on the bed-rock close to erosional gullies. The Middle Palaeolithic artefacts, though a few, come from this horizon. In the background of such occurence, five scatters representing Palaeolithic and Mesolithic, either seperately or in association, are studied.

Scatter 1 : One of the erosional gullies of Isukakalava has yielded Lower Palaeolithic rolled and patinated handaxes and choppers from bottom pebbly gravel (Gravel I). The overlying gravel II has yielded a few flakes and scrapers.

Scatter 2 : Two surficial scatters consisting of Upper Palaeolithic blades and microliths, respectively are found about 150 m to the north of the preceding scatter. The Upper Palaeolithic artefacts are made on fine grained quartzite of olive green colour, while the microlithic blades, lunates and points are shaped on quartz of milky, smoky and dull white colour.

Scatter 3 : This scatter occurs in between Renigunta Electric sub-station and Isukakalava. The pellety gravel surface measuring about 10 m has yielded exclusively microliths made on milky quartz. The primary components of the tools include baldes, scrapers, lunates and points. They are fresh.

Scattter 4 : A small scatter measuring about four square meters lies about 250 m to the north of the preceding scatter. Isukakalava is very close to the western side of the scatter. The light brown-soil surface has yielded Middle Palaeolithic tools of medium-grained quartzite occur on the surface and microliths, flake scrapers, blades, blade scrapers, lunates and points about 50 m north of the preceding cluster. These are made on milky quartz. The artefacts are fresh and have suffered no disturbance.

Scatter 5 : This scatter lies in a small erosional gully about 200 m furiher to the north of the preceding microlithic scatter

From the feeble second gravel layer a few diminutive handaxes flakes and flake tools along with blade and blade tools have been recovered. The artefacts are primarily Middle and Upper Palaeolithic and occur in primary context.

II. 10 Locus 10

This locus occurs on a wider region measuring over four square kilometers. On the southern side of this region a small hamlet known as Guravarajupalli is situated. On the northeastern side of the hamlet is the Guravarajupalli stream covering about 3 sq Km. All around the Guravarajupalli lake, are exposures of granitic rock surface. Eroded gullies of the Isukakalava drainage system join the Guravarajupalli lake as well as stream. The geographical features are the same as described for the Isukakaluva region. Palaeolithic here, occur, again surfacial scatters of Acheulian, Middle and Upper Palaeolithic and Mesolithic Cultural loci. However, in the present study, a few of these loci of the Palaeolithic and Mesolithic cultures are considered.

Scatter 1 : The scatter measuring adout 5 sq. m exclusively bears Mesolithic artefacts. About 100 m to the south of this scatter is the Guravarajupalli lake. The Microliths include flakes, lunates and points. The raw material is milky and crystal quartz. The locus is encircled by uncultivated rocky patches.

Scatter 2 ; This scatter occurs about 150 m northeast to the preceding one towards the aerodrome. On the eastern side of this scatter, a subterranean system is found traversing down towards the north. All along such drainage microlithic scatters are noticed both in feeble and good density. This scatter measures about 16 sq m and possesses large quantities of flakes and scrapers. A number of fluted cores were collected along with blades.

savanna type. Since this hillslope zone with a red sandy loam covers large quantities of boulders and cobbles, it is not suitable for agriculture and is relatively undisturbed. It would seem that the landscape during Palaeolithic occupations was not much different from what is seen today.

Exposures of fine-grained quartzite nodules and pebbles are very common in this part of the valley. The scrub savanna vegetation, nodules and pebbles of fine grained quartzite for raw materials, perennial water lakes, might have provided ideal niches for Upper Palaeolithic man, as is supported by high density of Upper Palaeolithic artefacts.

III. 1. Locus 1

The whole of the foothill region stretched between Yerpedu Ashram and Konamadugu gorge on the eastern foot of the Velikondas forms this locus. Isolated occupational scatters occur throughout in varying density. These clusters range from about 4 sq to 25 sq m and are invariably found in the vicinity of foothill lakes. From these hillslope sites, three clusters of average artefactual density are taken into account.

Scatter 1 : This scatter measures about 4 sq m. The Merlapaka lake is situated about 200 m to the north of this scatter. Middle and Upper Palaeolithic artefacts are found protruded on the surface of the loose ferruginous gravel on red sandy loam. They include flake tools of medium-grained blades and blade tools made of fine-grained quartzite of olive green colour. The artefacts are fresh and in mint condition.

Scatter 2: It is a 8 sq m occurrence located about 500 m west of the preceding scatter. The surfacial occurrence on loose ferruginous gravel of red loam comprises exclusively two scatters of Upper Palaeolithic artefacts. The typological variants are as in the preceding scatter. About 20 m north of the preceding cluster two microlithic occurrences are found. The artefacts are made on olive green fine-grained quartzite and also minor proportion of quartz.

Scatter 3 : The scatter measures about 9 sq m. It is an isolated occurence. Yerpedu Leprosy Centre is situated about 200 m to the west. There is a lake on the southern side of this occurence, a hill stream on the west.

The stratigraphy of this hill stream shows the following section (from bottom towards top).

Layer	Thickness in cm	Nature of deposit	Culture
1	5	Weathered granite	—
2	35	Pebbly gravel	Acheulian
3	20	Lateritic gravel	Middle Palaeolithic
4	4	Humus	Upper Palaeolithic

The surface scatter includes Upper Palaeolithic blade and blade tool variants made on fine-grained olive green quartzite.

A few flakes and flake tools were made on medium grained greenish yellow quartzite were collected by section scraping of loose laterite gravel.

Handaxes, choppers and a few fllakes along with cores have been obtained from the pebbly gravel layer. These are made on medium fine grained quartzite of light brown colour. The artefacts occur in a primary context.

III. 2. Locus 2

The locus stretches for about 5 km length from Yerpedu Ashram towards Leprosy Centre with a width of 500 m along the northern foot of Velikondas. Throughout the length Palaeolithic artefacts occur in varying density. Such occurrences are treated as scatters which are described hereunder.

Scatter 1 : Scatter 1 measures four square meters. On the north is the Ashram while on the eastern side a lake of about 80 sq m dimensions is situated. Middle Palaeolithic flake tools and Upper Palaeolithic blades, knives, blade scrapers, notches and cores as well as microlithic blades, flakes and lunates made on olive-green finegrained quartzite form the meterial.

Scatter 2 : About 10 sq m Late Acheulian in isolation from Upper Palaeolithic surface occurence form the or scatter. The lake specified in the preceding scatter is situated about 250 m northeast. The scatter consists of blades, blade scrappers, notches and denticulates along with cores and a few partially broken quartzite nodules. They are fresh and in mint condition.

Scatter 3 : This is the largest occurence at the Konamadugu gorge. The lake is situated within 200 m on the west of Konamadugu-Akkadevatalu area. It measures about 50 sq m. Late Acheulian and Upper Palaeolithic blades, blade tools like scrapers, notches. denticulates and backed blade variants along with cores have been collected. The raw material is fine-grained quartzite of smoky to olive-green colour. The artefacts are fresh and in mint condition.

Scatter 4 : The fourth scatter lies along 50 m southeast of the preceding occurence. It measures about 5 sq m and has yielded Late Acheulian artefacts made on coarse grained artefacts.

III. 3 Locus 3

The Locus extends for about 3 km from Leprosy Centre towards Venkatagiri town with a similar width (500m) of the preceding locus. From this stretch three loci of Palaeolithic and Mesolithic occurences are presently considered.

Scatter 1 : Scatter 1 measures five square meters. On the east is the Leprosy Centre while on the west Vempedu village plains are found. The Upper Palaeolithic blades and blade tools are made on fine-grained olive-green coloured quartzite.

lands in a primary context. The Swarnamukhi river is about 200 m on the east. Madhavamala is situated 3 km west to the locus. The artefacts occur on a small patch of uncultivated land in a thorny scrub zone, and including flakes, flake scrapers, blades, lunates, backed blades, and mic oliths. They are made on fine-grained quartzite of olive green colour. They differ from true Mesolithic which is characterized by inclusion of quartz microliths. Hence the olive green finegrained quartzite assemblages, similar type of which are known in the Rallakalava-Gunjana Valley can be tentatively ascribed to epipalaeolithic.

IV: 3 Locus 3 :

A patch of uncultivated land bearing Microliths forms this locus situated about 600 m northwest of Kobaka, a village. Out of about 200 sq m land artefacts are found scattered on the surface of about 10 sq m on the grassy area. They are in heavy eoncentration right on throny bush.

The artefacts include blades, backed blades, points, and a blade that exactly fits into core, has also been recovered. They are made on fine-grained olive-green coloured quartzite. They are fresh and in mint condition lying in light brown soil. Like the artefacts in IV. 2 Locus 2, above, they could be of epipalaeolithic type.

IV 4. Locus :

Two scatters measuring about 5 sq meter each form this locus. Yerpedu, a village is situated on the southwestern side of this locus. The microlithic clusters occur along with loose gravel on brown soil surface. The artefacts include flakes, flake tools along with blades and blade tools. The raw material is milky quartz. They are fresh.

CULTURES

LOWER PALAEOLITHIC CULTURE

The lower Palaeolithic culture is represented by the Late Acheulian industry. The Late Acheulian occupations are classified as (i) foothill sites, (ii) lakeside sites, (iii) streemside sites and (iv) hillslope sites. All the occupation scatters are in a primary context and have suffered only slight displacement by seasonal factors. Artefacts have been collected from (i) Surface occupational scatters, (ii) Section scraping (Locus II.7), (iii) Section of nullah (Locus III. 2), (iv) Sealed deposit site, (ii. 7) and (v) stratified context of a hillstream. Artefactual occurences in loci I.2, II.1, II.8 and II.9 were prolific. In some cases as at loci II.2 and II.5 they occur directly above the granitic bed rock. In locus II.7 artefacts occur loose in erosional gullies and also in a stratified context on the left bank perennial stream. Most of the artefacts are in fresh condition suggesting that they suffered little or no displacement and transportation. The assemblage is fairly homogeneous in typological and technological traits. Some of the artefacts at loci I.4, I.6 and II.9 patinated as they were embedded in the grit of weathered granitic rock. Quite a few of the artefacts at loci II.9 and III.3 have creamy calcareous matrix sticking on their external surfaces.

The artefacts were initially shapped by stone hammer technique and finished by cylinder hammer technique. They are characterised by small and shallow flake scars, symmetrical outlines, steep flaking, thin cross sections, straight to slightly sinuous profiles and near or total absence of cortex. The morphometrics of the tools from various loci - their sizes, raw

meterial used, technique of manufature and taxonomy - indicate a broad homogeneity in this industry.

Terminology

The classification and terminology employed in this study are after Kleindienst (1962), Bordes (1977) and Leakey (1971). Howevers, some modifications have been made to suit these typological schemes to Tirupati valley material.

The Industry

The industry comprise 2300 specimens out of which 537 (23.34%) are shaped tools while the rest 1763 (76.66%) form simple artefacts.

It is divided into two groups : (1) shaped artefacts and (ii) simple artefacts.

(i) Shaped artefacts : The artefact wise and site-wise distribution of the industry comprises artefacts showing deliberate finishing into distinctive tool forms. They are divided into :

a) Heavy duty tools : These are quite heavy with a natural back (over 10 cm long) on one side and a chopping, battering or scraping edge for heavy function and often clear use marks on the other side· These are classified as choppers.

b) Large cutting tools : These are normally (over 10 cm) long, having a unifacial cutting edge; they are further subdivided into handaxes, cleavers and picks.

c) Light duty tools : These are small tools (below 10 cm long) consisting of scrapers classified according to form and the nature of working edge (s).

ii) Simple artefacts : These are grouped into two types :

a) Used types : This type includes flakes revealing definite evidence of edge damage resulting from use. These are referred to as utilized flakes.

b) Debitage : This category includes flakes and small chips resulting from tool manufacture and retouch.

Out of the total 2300 specimens among which 537 (23.34%) shaped and 1763 (76.66%) simple artefacts, handaxes 376 (70 01%) are the largest group among shaped tools. The other types include scrapers (14 32%) choppers (8.00%), cleavers (6.33%) and picks (1.30%). Flakes form the largest (61.55%) category artefacts of the total assemblage.

Handaxes 376 ; 70.01%)

Majority of the handaxes are of oval shape (ovates 42.53%) and cordates (6.65%) other shapes are Micoquian (0.80%), triangular (2.18%), discoidal (3.99%), lanceolate (5.06%), limande (6 65%) and of untrimmed (pebble) butt (13.82%) types.

All handaxes are bifacially worked with several small and shallow trimming scars, sharp cutting edges, straight to sinuous profiles and thin biconvex/lenticular cross sections. Measurements of 227 handaxes from nine loci were subjected to metrical analysis, after Roe (1968, 1976).

Metrical analysis

The morphological classification of handaxes has been supplemented by metrical analysis to obtain accurate values of shape, size and other attributes and for comparison with similar temporal but different spatial industries. Metrical analysis of handaxes from foothill sites (I.1 Locus 1 to 7), streamside and lakeside sites (II.1 loci 1 to 10) and hillslope sites (III.1 loci 1 to 3) are considered here.

The parameters adopted for this analysis are as follows:

i) L: Maximum length in millimeters from bottom to the apex in the long axis at perpendicular to the short axis.

ii) B: Maximum breadth in millimeters taken perpendicular to the long axis.

iii) Th: Maximum thickness in millimeters.

iv) B_1: Breadth in millimeters at a point one fifths of the specimen's length from the apex.

v) L_1: Length from the base of the butt end to a point in the long axis where the maximum breadth falls.

vi) B_2: Breadth in millimeters at a point one fifths of the specimen's length from the base of the butt end.

vii) T_1: Thickness at the tip of the specimen in millimeters at a point one fifths of the length of the specimen from the end.

From these basic measurements, the following indices were derived by pairing as shown.

i. Thickness over breadth (Th/B)

ii. T_1 over length (T_1/L)

iii. Breadth over length (B/L)

iv. B_1 over B_2 (B_1/B_2)

v. L_1 over L (L_1/L)

The measurements and indices help us to derive information pertinent to an artefact group. The information thus derived can be expressed as hereunder:

1. Size

The frequency distribution of weight and length gives an idea about the size of the specimen. The large and heavier implements are obviously bigger in size. Roe rules out chronological and cultural significance for these attributes, but they appear to have some significance in the Indian context (Joshi *et al.* 1976). The comparison of Tirupati industry with Chirki (Early to Middle Acheulian), Gunjana (also late Acheulian) usually show that the mean length and weight diminish from

early to the late Acheulian. In the Chirki Industry, (Corvinus 1970: Marathe 1980) the length of the handaxes ranges from 90 mm to 190 mm, a majority of them falling between 120 mm to 160 mm with a mean of 1S7.9 mm. In the Late Acheulian of the Gunjana valley which is adjacent to the Tirupati valley (Raju 1981: 98), the length ranges from 90 mm to 190 but a majority of them fall between 90 mm to 130 mm with a mean of 122 mm. But in the Tirupati industry the length ranges from 50 to 190 mm and a majority of them fall between 80 to 140mm. It can thus be seen that the Early to Middle Acheulian forms of handaxes from Chirki area is large but Gunjana industry show slight variation to the present industry.

Weight in Chirki handaxes ranges from 100 gm to 1000 gm. A majority (67%) of them fall between 400 gm to 800 gm with a mean of 539.23 gm. In Gunjana Industry it ranges from 100 gm to 1000 gm but majority of them fall in between 100 gm to 400 gm with a mean value of 337.64 gm.

From these observations it can be seen that there is a progressive refinement from early to late Acheulian, the latter being well documented in the Tirupati valley.

2. Refinement

Roe uses the ratio Th/B to determine the refinement of the extent of flatness of an implement. This is found as a more convenient ratio than Th/L, because when implements are brok-en, the lenth of the specimens cannot be known precisely. A lower value of Th/B is directly proportional to the degree of refinement. In present handaxe groups Th/B ranges from 0.1 to 1.0 cm, a majority of them falling between 0.41 to 0.50(72:31.72%). In the Chirki. Acheulian assemblage over 80% of the handaxes have Th/B value above 0.56 with a range from 0.30 to 0.95 and a mean value of 0.64 (Joshi *et al.* 1976: 7). In the Gunjana assemblage 60% of the handaxes have Th/B value below 0.5 with a range from 0.1 to 0.8 with a mean value of 0.46 (Raju 1981). But in the Tirupati industry 90% of the handaxes have Th/B value above 0.70. In this parametre also the present industry vary strikingly

with Chirki and slightly with Gunjana. Thus a minor and local variation is apparantly visible between Gunjana and Tirupati industries. These values clearly indicate that the present assemblage is more refined than that of Chirki and Gunjana. Hence the slight variation between the Gunjana-Tirupati assemblages can only be explained as inter-site variability in a microgeographical area.

To avoid erros caused by misleading values of Th/B. Roe uses T_1/L ratio to check Th/B results. The T_1/L denotes the thickness of the handaxe at the tip.

As a whole, the metrical data makes it clear that the handaxes are refined and are of improved technology.

3. Shape

The shape diagram for handaxes B/L, B_1/B_2 and L_1/L ratios reflects the broadness or narrowness of the implement. The pointedness or bluntness of the tip is indicated by the B_1/B_2 ratio and L_1/L ratio gives the position of an implement's maximum breath, measured as a distance from the butt end in ralation to length. Based on the values of L_1/L the handaxes are arbittrarily grouped into three sections: (i) 0.01 to 0.350: (ii)0.351 to 0.550 and (iii) 0.551 and above. The scatter diagram can be plotted to devide into three classical sections.

The features indicate the well-advanced technologicall level of the handaxe assemblage from the Tirupati valley thereby justifying its assignment to Late Acheulian phase.

Cleavers

These are large shaped tools whose charecteristic feature is a cutting edge at the tip running transverse to the long axis of the implement either at right angle to or some what inclined. They may sometimes have length of cutting edge on the sides (Roe 1976).

In the Tirupati valley Acheulian assemblage, cleavers are fewer than handaxes. Such is the case with the other southeast coastal Acheulian sites.

There are 34 specimen in the collection. These are exclusively made on flakes end struk (15), side struk (10) and indeterminate (9). A majority (31) of the implements are fresh. Only two specimen are weathered and are patinated.

The cleaver edge is an outcome of an intersection of the flake surface of the specimen with only one flake scar in 13 cases, two and more than two in 21 cases. The working ebge is sharp in 27 impliments and blunt in the rest of the specimens. In a majority (24) of them the edge is damaged indicating that they have been used.

The cleavers fall into (1) convergent, (2) divergent and (3) parallel groups. A classification based on these morphological characters is given below.

Cleaver cutting edge	Frequency	Percentage
1. i. Convergent with transverse cutting edge.	4	11.77
ii. Convergent with convex cutting edge	2	5.88
iii. Convergent with oblique cutting edge.	5	14.70
2. i. Divergent with transverse cutting edge.	5	14.70
ii. Divergent with convergent cutting edge·	1	2.94
iii. Divergent with oblique cutting edge.	4	11.77
3. i. Parallel with transverse cutting edge.	6	17.64
ii. Parallel with convex cutting edge.	3	8.82
iii. Parallel with oblique cutting edge.	4	11.77
Total	34	99.99

Most of the implements are trimmed on both lateral margins in shaping the working edge. The working edge makes an angle of 80° with the major axis in 3 specimen and 86° - 90° in 5 specimen and above 90° in the remaining 26 specimens. In cross section, 8 specimen are biconvex, 10 plano-convex, and 16 lenticular.

The mean length, breadth, thickness and cleaving edge length are 121.18, 79.41, 35.29, and 58.5 mm respectively.

Choppers (43 : 8.00%)

The choppers are made on cobbles with rounded cortex surface forming the butt end. The trimming is found on both ends and lateral sides with a number of flake scars on the working edges. The specimen from lakeside loci as at II.8 and II.5 show secondary trimming on the working edge. Marks of utilization are often found on the specimen and this is confirmed by battered blunted edges.

These implements form a minor proportion of the total tool kit of the valley. This proportion also holds good with any established sites of the southeast coast.

The sub types of the specimen include side, end and pointed types summarised as:

Chopper variant		Frequency	Percentage
i.	Side choppers	27	62.79
ii.	End choppers	10	23.25
iii.	Pointed choppers	6	13.95
	Total	43	99.99

The length, breadth and thickness measurements range from 61, 70, 39 mm to 137, 179, 75 mm respectively.

Scrapers (77: 14. 32%)

Based on the occurence of working edge on flake, the scrapers are categorised into side and end types. The length, breadth and theikness values range from 107, 98, 29 mm to 37, 50, 21 mm respectively.

Side Scrapers (61: 11.35%)

Among the side scrapers 58 specimens show single margin working edge where as three specimens show double margin. Among the former type 30 specimen retain straight working edge while 18 show convex and the rest 10 possess concave working margins.

End Scrapers (16: 2.97%)

Among the end scrapers 11 specimens have working edges throughout the length of the transverse margin while five specimens show only on a part of it.

Flakes (1577: 68.55%)

The flakes are distinguished into three types: |i| end struck |415:23.53%|, |ii| side struck |714:40.4%| and |iii| indeterminate |448:25.41%|. Most of the specimens of locus I. |1| show prominent bulb of percussion: many specimens are partially broken at locus I.4, where chips also are in plenty, many specimens are broken. In general, the flakes are fresh and a sizable proportion |621:39.38%| show marks of use especially at locust I.1. The length, breadth and theikness values ranges from 59, 52, 20 mm to 102, 76, 43 mm in the case of end struck, from 45, 60, 79 mm to 89, 121, 26 mm in the case of side struck and from 62, 53, 15 mm to 122, 85, 24 mm among the indeterminate specimens.

Technology

Most of the specimens show a number of small and shallow flake scars all over the surface. The presence of cortex

on cores is very rare. Step flaking is present. Negative flake scars on cores suggest the use of stone hammer technique. The method of removal of flakes show controlled flaking.

A few cores show alternate flaking with a few negative flake scars on both dorsal and ventral surfaces. These are deep and irregular on the cores and core tools, and suggest stone hammer technique.

The raw material is coarse-grained quartzite in the case of all foothill sites, i.e., loci I.1 to 8 and medium to medium fine grained at others. This occurs in the form of pebbles, cobbles, chunks and nodules throughout the Swarnamukhi basin of the valley. The pebbles and nodules occur close to the river.

Many of the artefacts (1014:44.08%) show red patination as at loci 1.5, 1.6 and 1.7. The retention of sharp working edge and the freshness of the tools show that they suffered least transportation primary cantext of occurrence.

INFERENCE

The Acheulian artefact assemblage have been found in surface occupational scatters in major loci, pebbly gravels as at locus I.1, section scraping as at locus 1.4, directly on granitic bed rock as at II.2, sealed occupational locus as II.7, gritty surface of weathered granitie bed rock as at locus III.3

Though artefacts in some cases are weathered and patinated, the flake scars are sharp, indicating that they suffered least transportation. Relatively undisturbed state of occurrence indicates that the landscape has not been much altered since the Acheulian times. In the Indian stone Age sequences sub-cultural phases within the Acheulian are as yet obscure when compared to those in Africa. Such a problem is attempted (joshi *et al.* 1976, 1977, 1978: Marathe, 1980) to be resolved by stratigraphical means to make out an evolutionary sequence of the Acheulian. The researchers carried out metrical analysis of han-

daxe assemblages from Chirki-Nevasa on Pravara and have established crude and unrefined state of the industry quantitatively compared to other advanced Acheulian industries like Paleru (Rao 1979) and assigned it to early to Middle Acheulian phase. Similarly, Raju (1981) followed the same quantitative method and assigned the Gunjana Industry to late Acheulian phase. Moreover, the distance between Gunjana assemblage and Tirupati assemblages is not much, hence they show commonness in assigning the industry to a Late Acheulian phase. The comparative morphometric features are as follows;

	Chirki	Paleru	Gunjana	Tirupati
Lenght in mm	137.90	98.00	122.20	118.35
Breadth in mm	76.30	68.90	80.20	72.60
Thickness in mm	48.80	30.60	34.80	31.55
Thickness/Breadth	0.64	0.44	0.46	0.42

A glance at the statistical details shows that the handaxe assemblages from Chirki are heavier, larger, thicker and cruder than those at Tirupati. These handaxes often have worked butts and are partly flaked when compared with the fully flaked symmetrical implements with sharp edges from Tirupati handaxe assemblages. Similarly, though the Gunjana assemblage shows a minor variation, it fairly falls within a similar phase as the aerial distance between Gunjana and Tirupati area is less than 100 km. The distance between the two i.e., Gunjana and Tirupati was very small and Acheulian groups could easily have moved from one area to the other, In support of this, Clark (1970:80) says that "the components of the Lower Acheulian are chiefly charactedized by the bold nature and the small number of flake scars as well as by the lack of refinement, which comes from using a hard hammer or anvil of stone for working the tools. Otherwise lower Acheulian aggregates fairly closely resemble those of the upper and the later stage".

Further, Issac (1969: 16) recongized two cultural stratigraphic sub-divisions of African Acheulian. Lower Acheulian

industries are characterized by implements of simple work and least bold retouch indicating stone hammer techniques. Upper Acheulian industries include refined artefact with a large number of shallow trimming scars typical of the cylinder hammer technique. In such a situation, the number of trimming scars and the ratio of Th/B is helpful quantitative discriminant between these two sub-divisions.

When the questin of southeast coastal industries arises the lower Palaeolithic industries from the adjoining regions such as Renigunta (Murty, 1966) and Pennar (Sudarshan 1968), Gunjana (Raju 1981) and Gundlakamma (Issac 1960) are also characterized by Acheulian. At all these sites Late Acheulian is well represented. Not withstanding the fact that minor variations are visible in the frequency of artefact occurrence at these sites, all of them display similar typo-technological features and all fall within the Late Acheulian complex of the southeast coastof India.

Ecology

Coming to ecology, a study of the Tirupati-Renigunta-Gunjana region, flanking the Velikondas and Mamandur forest, indicates that there was not much change in the landforms on which Acheulian is present, and the extensive distribution of Acheulian scatters in different microenvironmental zones points out that these ecosystems were ideal for the storeage hunter–gatherers.

Chronology

In the absence of any biological remains from Tirupati valley to reconstruct palaeo-environment and to date the industry, the available evidence from similar industries is made use of.

Lower Palaeolithic industries are found in association with Middle Pleistocene fauna at alluvial deposit of the Narmada [De Terra and Paterson 1939: Khatri 1966], the Goda-

vari [Joshi *et al.* 1976] and Pravara [Sankalia 1966]. The faunal remains include Middle Pleistocene species like *Bos elephas* and *Equus* species which existed during the Upper Pleistocene. Josh [1978] puts most of the sites of Central Narmada, Upper Godavari and Krishna not older than Late Pleistocene. Fossils like *Bos namadicus*, *Hexaprotodon palaeoindicus* and *Elephas pysudricus* confirm the geomorphological data and puts the Acheulian culture in Upper Pleistoene age.

Radio carbon dates for the upper parts of the older Alluvium in western Maharashtra range from 19000 to 39000 B.P. [Agrawal and Kusumgar 1967, 1975]. Alluviums of this phase are associated with Middle and Upper Palaeolithic industries. Based on the radiocarbon dates and geomorphological evidence Rajaguru [1970, 1978] assigned the Lower Palaeolithic industry of western Maharashtra to early Uppper Pleistocene.

Recently at Umarethi Dam site in Saurashtra, miliolite limestone overlying the Acheulian implement ferous gravel has been dated by Uranium Thorium decay series method to 160,000 B.P. to 170,000 B.P. [Hussain *et al.* 1980, 27–78]. While Acheulian in Saurashtra is at least older than 170,000 B.P. As the Tirupati valley Acheulian is advanced in technology, it is treated as younger than the early Acheulian facies of western India, and can be assigned to Upper Pleistocene, possibly to 150,000 B.P. By these relative chronological indices, the Late Acheulian of the Tirupati valley be ascribed to Upper Pleistocene [c. 10000,000 to 60,000 B.C.]

MIDDLE PALAEOLITHIC CULTURE

The Middle Palaeolithic of the Southeast coast in general and the Tirupati area in particular belongs to Mousterian of the Acheulian facies. In the study area, the Middle Palaeolithic sites broadly fall into (1) streamside and/or lakeside sites located at 106 m AMSL and (2) hillslope sites located at 92 m AMSL. These contours present various physical features of Middle Palaeolithic. The distribution of Middle Palaeolithic occurences is given below.

1. Surface occupation scatters on red loams. The artefactual occurence is rich at locus II.7. The artefacts also occur in a stratified ferruginous gravel section of a nullah. Because of surfacial and stratified occurrences, a trial pit was excavated at this locus and is discussed here.

2. Surface occupation scatters on gritty granite rock surface as at locus II.8. A thin deposit of soil occurs at some of the scatters at this locus as at II.8 (2) and (3).

3. From stratigraphical section of hillstreams as at loci II.7, II.9 and III.3.

4. Section of a nullah as at locus II.10, and

5. Sealed occupational occurrences as at locus II.7

The assemblage is fairly homogeneous from typotechnological point of view. But metrical analysis distinguishes the industry into two (i) large flake tools as at locus II.8 and (ii) small flake tools as at locus II.7. The artefacts at the former locus show dirty white patination while those at the latter are in mint condition.

Flake blanks utilised for making finished forms are struck from prepared cores. Faceting of the platform, though present on some flakes, is not the rule. Flake blanks struck from irregular simple cores are also utilized. The flake blanks are finished by methods of secondary retouch into finished tools. Bifacial working, step flaking and steep flaking traditions of the Late Acheulian persist in the Middle Palaeolithic and especially the scraper types are typical. As these display morphological similarities to the Mousterian (as can be seen in the point variants) with the presistence of Acheulian traits, this can be regarded as the Mousterian of the Acheulian facies. The raw material in all the cases is predominantly medium-grained quartzite, though coarse grained to medium-grained quartzite was also utilized.

Terminology

The classification and terminology followed in this study are after. Clark (1961) Kleindienst (1962) and Bordes (1977), with partial modification to suit the data.

The Industry

The industry comprise 1471 specimens out of which 362 (21.61%) are shaped tools while the rest (1109 : 75.39%) are simple flakes.

The industry is divided into two groups (i) shaped artefacts, and (ii) simple artefacts.

i. *Shaped artefacts :* This group consists of artefacts which are finished into tool forms such as (a) miniature handaxes, (b) choppers, (c) side scrapers, (d) denticulates, (e) end scrapers, (f) end and side scrapers (g) notches, (h) points and (i) borers.

a) Miniature handaxes (24:1, 63%)

The miniature handaxs are similar to those of the preceding culture, but in a diminutive form. Small and shallow flake scars are extensive on the specimens, especially at locus II.8. The implements show secondary marginal retouch, plano to biconvex cross sections, straight profiles and symmetrical outlines. In many cases as at locus II.5. the taps are trimmed and pointed both at proximal and distal ends. Some of the specimens are patinated due to their contact with the gritty weathered granitic bed rock as at locus II.9, A few specimens are weathered at locus III.3.

b. Choppers (6: 0.40%)

The specimens are like the choppers of Lower Palaeolicthic but they are smaller in size and more refined in technology. The artefacts often have pebble butts and sharp trimmed working edges. Choppers occur in assemblages from stream side sites predominantly. Typologically, four of these are end

choppers and the remaining two are side ones. The specimens at locus II.9 are patinated into dirty white colour.

c) **Side scrapers** (215 : 14.62%)

The side scrapers include a variety of sub-types. These form numerically the largest category among the shaped artefacts of this industry. These are basically of two sub-types. (i) Single side scrapers and (ii) Double side scrapers. Each of this group is further characterized by the nature of retouch and the working edge on the specimens.

(i) Single side scrapers (175 : 81.39%) : Among these specimens, the working edge occures only on any one of the lateral sides of a flake. Based on the domination of the nature of the working edge the specimens are designated as follows :

Nature of the working edge		Expression	Frequency	Percentage
1.	Straight	SS_1Str	41	23.43
2.	Concave	SS_1Conc	95	54.28
3.	Convex	SS_1Conv	24	13.71
4.	Ventral retouch	SS_1Vent	2	1.14
5.	Steep retouch	SS_1Steep	13	7,43
		Total	175	99.99

The single side scrapers (74.40%) among the sub types dominate over the double side (25.60%) specimens. These specimens occur at all the loci of streamside and/or lake side sites. Their concentration is high at lake side sites as at loci II.1, II.8 and III.3. Within the single side type, the concave type has the highest occurrence (44.18%). Many of the specimens display use marks. In physical condition they are fresh as at locus II.7 and partly weathered as at loci II.6 and II.10.

(ii) Double side scrapers (40: 18.60%): Among these implements, the working edge occurs on both the lateral sides of flake. There are a few specimens though the are rare, with the working edge on more than two sides. These are classified as follows:

Nature of working edge	Expression	Frequency	Percentage
1. Working edges straight on both sides	SS_2Str	12	30.00
2. Working edges straight on one side, convex on the other	SS_2Str. Conv	7	17.50
3. Working edges on both the lateral margins with concavity	SS_2Biconc	8	20.00
4. Working edge on one lateral margin concave and convex on the other	SS_2Conv. Conc	4	10.00
5. Instead of on two lateral margin, some specimens have working edges on any one of the lateral margin and on the apical end	These are designated as "dejete end"	9	22.50
	Total	40	100.00

A high occurrence of the double sided scrapers occur among the lakeside sites in general, particularly at loci II. 1 and II.8. A minority of the specimens show dirty white patination at locus II.8.

(d) Denticulates (26:1.76%)

The denticulates are the third highest after side scrapers. The ratio of denticulates to sides scrapes at all streamside sites

is 26:175. The specimens found at streamside loci like II.8 and II.9 display 3 to 4 denticulations, whereas other specimens at other loci show less than four. These are predominantly shaped on the elongated end and side flakes.

(e) End scrapers (13:0.88%)

The end scrapers occur in high frequency at hillslope sites like loci III.1. They also are associated wirh nearby loci such as at loci II.8 and II.9. In the case of hill slope locus mentioned above, the retouch is perfect and the specimens exhibit clearly use marks. Among some scatters like II.1 and III.3, the specimens are buried in run off sand. In such cases the artefacts are quite fresh and shining.

(f) End and side scrapers (9: 0.61%)

The end and side scraper variants also occur along the hillslope and adjoining loci as specified in the case of the preceding type. The end scraper, and end and side scraper variants occur in the ratio of 4:3 among all loci.

(g) Notches (54: 3.67%)

The occurrence of notches is the second highest after side scraper variant. As in the case of side scrapers and denticulates, notches also occur at all loci. These are smaller than concave side scrapers in dimensions. The specimens display edge damage at loci II.7, II.9 and III.1.

h. Points (5: 0.33%)

These artefacts have least representation in the industry. Their occurrence is confined to loci II.9 and III.1, which are hillslope sites. The specimens at the latter locus are well preserved while the others are patinated to dull grey.

i. Borers (10: 0.67%)

Borers occur at stream and lake side sites only. A few of the specimens from locus II.8 can be regarded as text book

examples. These are found in association with high occurrence of side scrapers and notches as at loci II.8 and II.5. Borers are bifacially worked, projecting into a beak like working tip.

2. Simple artefacts

The typo-technological variations along with the frequency and percentage of these groups of simple artefacts are discussed as follows:

a. Cores (144: 9.80%): The cores from the collection can be classified into the following types based on shape and other morphological expression. They are (1) Amorphous and (2) Discoidal. A few of the discoidal cores show a sharp circular periphery. A minor proportion of cores at locus II.9 retained partial cartex. Some of the prepared cores are characterized by exhaustive flaking as at loci II.7 and II.8. Some of them show faceting of the platform.

b. Flakes (802: 54.53%): Flakes form the highest frequencyl among the simple artefacts in the total industry. Within the tota flakes (802: 54.53%) about 47 (5.80) display use marks on the margin and three (0.07%) specimen are a typical levallois type. Among the three (i) end struck, (220: 29.26%) (ii) side struck (183: 24.33%) and (iii) indeterminate (349: 46.41%) types, the end struck occur in high ratio particularly at loci II.8 and II.6.

c. chips (163: 11.39%): The chips are flakes ordinarily but do not retain either bulbar portion or platform. In the present industry all the flakes which fall below 2 cm length are treated as chips.

TRIAL EXCAVATION

A small trial excavation was carried out at Sitarampet village to confirm the cultural chronology and the stratigraphic position of the assemblage found on the surface.

A small trench measuring 3×2 m was dug at locus II.7 about 800 m west of Swarnamukhi river on the left bank and 200 m east of Tirupati–Nellore bus road at a completely

undisturbed locality. The trench is divided into six sequre meters which were designated as A_1, A_2, A_3, A_4, A_5 and A_6. The cultural material recovered is recorded at an interval (depth) of 5 cm each. The following sequence is revealed.

Section of Sitarampet Trench facing east

Layer	Depth	Nature of deposit	Material
1	00–05	Ligth–brown	Sterile
	06–10	Sandy loam	,,
2	11–15	Dark-brown sandy loam	,,
	16 20	Ferruginuous gravel	Flakes and flake tools
	21–25	,,	,,
	26–30	,,	,,
	31–35	,,	,,
	36–40	,,	,,
	41–45	,,	,,
Layer	**Depth**	**Nature of deposit**	**Material**
	16–50	Ferruginuous gravel	Handaxes broken pebbles
	51–55	,,	,,
	56–60	Weatherd granitic bed	,,
	61 and below	rockGranitic bed rock	Granitic bed rock

A total of 2832 artefacts including debitage were recovered. The primary cultural layer of Lower and Middle Palaeolithic lies at a depth in between 16 and 55 cms.

INFERENCE

The technological traits of Tirupati Middle Palaeolithic assemblages are in agreement with the Middle Palaeolithic of the other inland coastal sites like Renigunta on the Rallakalava (Murty 1966), Nandipalli on the Sagileru (Reddy 1968), Nandana Mearella on the Paleru (Rao 1979), Vinukonda on the Gundlakamma (Isaac 1960) and Peddarachapalli in the Gunjana (Raju 1981). The Middle Palaeolithic on the southeast coast comprises miniature handaxes with secondary marginal retouch, plano-convex to bioconvex cross section, straight profiles and symmetrical out lines. The raw material in almost all sites is primarily medium to finegrained quartzite.

Among the Tirupati industries it is almost medium grained quartzite at all sites except at locus II.7, where it tends to fine-grained along with yellowish green .colour. In general, pebbles and nodules of quartzite used as raw material occur abundantly in the area. Such occurrences are well exposed at locus II.9, a hillstream site and loci II.7 and II.10 in an erosional nullah of a lakeside site. These pebbles range from very small to medium size. The artefacts at loci II.8 and II.9 are often patinated, and are in mint condition.

This suggests that they suffered minimal transportation and whatever slight displacement they suffered was due to surface run off. The fact that the artefact scatters were relatively undisturbed indicates that landforms were not much altered by natural and other agencies since the Middle Palaeolithic occupations took place.

During this phase also Tirupati-Renigunta, Gunjana region of Velikondas and Mamandur forests, did not experince much change in ecological conditions. In fact, the extensive distribution of Middle Palaeolithic loci towards the north eastern side to Velikonda-Mamandur itself suggests that this part of the valley was much congenial for Middle Palaeolithic occupation. The surficial distribution of these sites was

much extensive than that of Acheulian culture. It is also striking that in comparison with Acheulian, Middle Palaeolithic is more closely associated with perennial water sources as at many hillstream sites like loci II.7, II.9 and III.1–3 and also lakeside sites like loci II.8, II.10 and III.1 located at 106 m AMSL, which is a lower contour than that of Acheulian.

Chronologically the Middle Palaeolithic in this region as elsewhere in the country is associated with the younger alluvial deposits. Radiocarbon dates can reach only up to 40,000 B.P. and therefore the Early Palaeolithic as beyond their range (Agrawal, 1982 : 55). Radiocarbon dates from Maharashtra (Rajaguru and Hegde 1972, 1976) give this culture a date of c 30,000 B.P. and the layer over lying the Middle Palaeolithic is dated by radiocarbon method to c 25,000 B.P. (Reddy 1968). This indicates that the Middle Palaeolithic on the south east coast is older than c 25,000 B P.

UPPER PALAEOLITHIC CULTURE

Stone Age research in India until the first half of the present century has revealed rich and wide-sparead evidence of human occupations during the Lower and Middle Palaeolithic and Mesolithic periods (Sankalia 1974). But the evidence for Upper Palaeolithic then was, considered comparitively scanty and sketchy. During the early part of this century Cammiadae and Burkitt (1930) observed blade element in the series III stone assemblages of the southeast coast, and De Terra and Paterson (1939) in the Late Soan B of the Potwar Plateau. These industries belonged to pre-Mesolithic and post-Middle Palaeolithic. These as well as a few more finds of blade assemblages did not receive due recognition, then, in the sequence. Since then, particularty for the last twenty years, the evidence for Upper Palaeolithic has been found from different parts of the Indian subcontinent (Murty, 1980). Important discoveries for the Upper Palaeolithic are made from :

Andhra Pradesh

The Gundlakamma valley, Kurnool district (Issac 1960); Renigunta, Chittoor district (Murty 1968, 1970); Yerragondapalyam, Prakasam and Vemula, Cuddapah district (Reddy 1970); the limestone caves in Kurnool district (Murty 1974, 1975, 1979 and Murty and Reddy 1970) : Gambheram valley, Vishakapatnam district (Reddy and Prakash 1978); Gunjana velley, Cuddapah district (Raju 1981); Tirupati valley (Jacob Jaya Raj 1978, 1979, 1980, 1981, 1985, 1986).

1. *Karnataka* : Salvadgi (Seshadri 1952); Shorapur Doab (Paddayya 1970).

2. *Maharashtra* : Patne (Sali 1974); Inamgaon (Kajale *et al* 1976).

3. *Madhya Pradesh* : Bhimbetka cave and rock shelter (Misra *et al.* 1979)

4. *Uttar Pradesh* : Belan valley in U.P. (Sharma 1973) and Soan valley in M.P. (Sharma and Clark 1980).

5. *Bihar* : Singbhum district (Ghosh 1970).

6. *Gujarat and Rajasthan* : A few sand dune sites (Allchin *et al.* 1977).

Among them, the industries from Chittoor, Cuddapah and Kurnool on the southeast coast are the most typical. In this context the data collected from sites in the Tirupati valley corroborates the observations from earlier investigations around Renigunta and Gunjana valley also reveals a few typological variations. The Upper Palaeolithic sites of the study area are categorised as below :

1. *Streamside and/or lakeside sites* : These are located at 106 m AMSL, such as loci II.8, II.9 and II.10. Each of these loci is spread over a few kilometers on the eastern foot of Velikondas. However, in the present study only a few clusters of moderate artefact occurences are considered.

2. *Hill slope sites*: These sites also are located at 92 m AMSL, such as loci III.2 and III.3. Each site is scattered over a few kilometers along the northern foot of the Velikondas. Here the artefacts occur in isolation as at loci III.1 and IV.3.

3. *Gorge site* : This site too is located at 92 m AMSL in the Akkadevatalakona gorge, It is disturbed due to grazing by sheep and cattle. Only three clusters which are less disturbed are included in the present study,

The Panorama of ecosystem suggests that the dry deciduous forests and the high hills with abundant flora and fauna must have played a decisive and dominant role in the selection these sites for occupations by Upper Palaeolithic hunter-gatherers. As such, these sites and the environs provide ideal situations for the study of Palaeolithic occupational occuraneces in general, and Upper Palaeolithic in particular. The artefacts collected from :

1. The surface closer to a hillstream as at locus II.9;
2. The surface nearby a nullah as at II.10 cut by erosional gullies ;
3. The surface of hillslopes in the midst of scrub thickets as at loci III.1 and III.2 and
4. The surface of dense scrub vegetation as at locus IV. 1 The assemblage is hemogeneous and shows fairly uniform typotechnological aspects.

Technology

The raw material used is fine-grained quartzite of ash, cream and light green to olive green shades (91.7%) and black lydianite (8.21%). The majority of the finished tools are on fine grained quartzite (94.4%) and a few on lydianite (5.53%).

The industry is characterized by blades, and tools made on blades. Tools made on flakes also form a portion of the industry. The occurrence of Levallois element suggests the

persistence of prepared core technique from the Middle Palaeolithic. Usually blades are removed from prismatic cores. These blades are long and slender with two parallel margins, with one or more parallel ridges on the dorsal surface. They show triangular and trapezoidal cross-sections respectively. The cores and other simple artefacts give a clear picture of methodology followed in blade production. Quartzite chunks with natural flat surface are utilized, the flat surface serving as a platform. Covergent and parallel flake scars on some cores suggest initial dressing of a core with stone hammer and cylinder hammer.

Primary flaking has been done in many directions in a semicircular fashion. This is further supplimented by cross and parallel flake scars on the dorsal surface of some flakes and broad blades. Some percentage of cores suggest that after primary dressing, ends are trimmed perpendicular to the surface as desired to obtain an appropriate platform to detach blades. A series of blades were then struck off along the circumference in all likelihood with the aid of an intermediate punch and a hammer. Whenever a blow is struck a little inside to the peri, phery, thicker and broader blades are removed. Such blade- are characterized by more than one ridge on the dorsal surface. A few cores suggest removal of blades on one side and in many cases on both the sides. These blades are further shaped into backed blade variants and other shaped forms by steep blunting with pressure technique.

Teminology

Murty (1979: 303–12), classifies the Indian Upper Palaeolithic into three broad typological groups based on technology. They are:

I. Flake-blade industry: This industry is characterized by comparatively broad blades which makes one infer a crude state of blade technology. Scrapers, points and borers made on flakes-blades are common types, but scrapers form the predominant type. Blades, knives and burins are also found in low proportions.

2. **Blade tool industry** . This industry includes large to small sized blades, backed blade tools, scrapers, points awls and burins on flakes, flake-blades and blades. The occurrence of backed blade variants and burins is low.

3. **Blade and Burin industry** : This industry primarily consists of blade, backed balde and burin elements. Backed blade tools such as points. penknives, macrolunates, macrotriangles and macrotrapezes, scrapers on flakes, flakeblades and blades, typical burins form major proportion. Unifacial points, chopper, bored stones, hammer stones and anvils also occur.

Blade and burin assemblages form a distinct entity on the south-east coast with at least three recognizable local variants: (l) Low representation of backed blades (12.7%) and burin (4.9%) elements as at Erragowdapalem, Prakasam district. (2) High representation of backed blade (67.3%) elements as at Renigunta, Chittoor, and (3) Very high representation of blade element (69.9%) with an increasing tendency towards microlithisation and with the burin element (0.5%) becoming less marked as at Peddarachapalli, Cuddapah district.

Considering the nature of occupations in the Tirupati valley it can be suggested that the assemblages represent different activity areas, geared to an exploitation of the foothill zones.

In the industry of Tirupati valley scrapers [especially side scraper, concave and notch], blades and backed blades in that order are dominant. Considering the extension occupation in the Lake and Stream sites it appears plassible that the occupations in the foothill zones of the Tirupati valley represent wet season occupations of the human bands which, in all probability, moved up to the foothill zones from the lake and stream niches of Tirupati-Ranigunta-Yerpedu zone.

The industry comprises 2342 specimens which include shaped specimens [412: 17.59%], simple artefacts [1930: 82 41%] and others (5 specimens). In association with artefactual

assemblages others, such as natural blocks, nodules used as hammer stones and anvils occur at some loci. Bored stones have been found only at streamside and lakeside sites. For calculating the percentages these five specimens included in other categories are not teken into account.

Shaped artefacts (412: 17.59%):

This category comprises nine types as shown against their frequencies and percentages as below

Type	Frequency	Percentage
1. Side scrapers	169	41.09
2. Denticulates	9	2.18
3. Notches	24	5.82
4. Knives	100	24.25
5. Backed blades	39	9.45
6. Crescents	29	7.03
7. Burins	32	7.76
8. Borers	4	0.97
9. Points	6	1.54
Total	412	99.99

a. Side scrapers (169: 41.09%)

The side scrapers form the highest frequency among the finished types, which includes two sub-types (1) Single side and (2) Double side scrapers made on flakes as well as blades.

1. Single side scrapers (121: 71.59%) : Among these specimens the working edges occur on any one of the lateral margins

of a flake or a blade. Based on the nature of working edge the specimens are distinguished as:

Type	Working edge	Frequency	Percentage
Straight working edge	SS_1Str	36	29.75
Concave working edge	SS_1Conc	53	43.80
Convex working edge	SS_1Conv	32	26.45
	Total	121	100.00

These tools occur almost at all loci, except at streamside and gorge sites. Within the single side scraper variants, the concave (53: 31.36%) scrapes are twice in number to those of the other types. Quite a majority of these specimens at loci II.8 and III.3 show edge damange due to use.

2. Double side scrapers (48: 28.41%): Among these specimens the working edges occur on both the lateral margins. They are:

Type	Working edge	Frequency	Percentage
Working edges straight on both lateral margins	SS_2Str	26	54.17
Working edge with concavity on both lateral margins	$SS_2Biconc$	11	22.92
Working edge concave on one margin and convex on the other margin	$SS_2Conc. + Conv$	8	16.67
Working edge divergent on lateral margin and meets oblique transverse end.	Called as "Dejete"	3	6.24
Total		48	100.00

Within the double sided scraper variants, a high frequency of straight type (26: 15.18%) are found. A majority of this type is distributed at streamside sites like locus II.9 and lake side sites like loci II.8 and II.10.

b. Denticulates (9: 2.18%)

Out of the nine denticulates 8 show working edge on only one lateral margin while one shows incipient denticulation on the second margin also. Specimens from locus II.8 show3-5 denticulations, while the othes normally display 2–3 only. Those from locus III are more refined in workmanship.

c. Notch (24: 5.82%)

The notched artefacts occur at all the loci. This tool type forms the highest category among the finished specimens. The notches show direct proportion with the side scrapers (169; 41.09%). Among the streamside and/or lakeside, hillslope and foothill sites, the gorge site specimens form oue third of the total collection of this type (24:8). They are large and the edge damage due to use is more on the specimens at the Gorge site locus IV.1

d. Knives (100: 24.25%)

These are divided into two sub types. (1) Backed and (2) Natural back.

1. Backed knives (36: 8.73%) : These specimens are characterized by blunting on the margin opposite to the sharp edge of the blade. Where blunting is completely done, the specimens are characterized by a number of very small and shallow scars. Among these types, 23: are a high occurrence observed at hill slope sites like loci III.1, III.2 and III.3. These also show use marks.

2. Natural back knives (64: 15.52.) : As the names suggests these are characterized by a natural back opposite to the sharp working edge of the specimen. These are almost double

(64:36) to backed knives. Most of the specimens are concentrated around hillslope sites, as at loci III.1 and III.2 and also gorge site as at locus IV.1. the artefacts are characterized by conspicuous thickness of the natural back. These are relatively thick and large and also show use marks.

(e) Borer (40.97%): These are only four tools of this type. All of them are shaped on at the distal end.

(f) Burins (32.76%) The Burins form a characteristic tool type of this industry. These occur at all sites and loci with a high density among hillslope sites as at locus III.2. Based on the typo-technological variation the Burins are further classified into the following types.

Burin type	Frequency	Percentage
i. Central	6	18.60
ii. Bevel	8	25.00
iii. Angular	9	28.50
iv. Right	1	3.10
v. Dihedral	2	6 20
vi. Concave	2	6.20
vii. Convex	4	12.40
Total	32	100.00

Bevel and angular variants occur is a higher frequency, significantly, most of the two variants occur at hill slope sites as at loci III.1 and III.3.

(g) *Pointed Blades* (6: 1.45%): These form one of the leas represented types and characterized by thin blades with a pointed distal end. In four cases the tip of the point is broken while the remaining two show blunted tips.

(h) *Backed Blades* (39: 9.45%) : The majority of these tools are concentrated at hillslope sites as at loci III.1 and III.2.

They are also found at gorge site IV.1. However a significan concentration of these specimens ranging to one third (12: 39) are found at locus II.9, a streamsidesite site. At loci such as II.8 and II.10, the specimens are absent.

(i) *Crescents* (29: 7.03%) : The crescents occur primarily at all hillsopes, at all the scatters of each locus such as at III.1 to 3. Among the streamside sites locus II.9 is the only one to yield crescents, yet its representation is highest (9: 2 18%) when compared to those at the other Loci.

2. Simple artefacts

The simple artefacts include the following :

	Types	Frequency	Percentage
i.	Cores	298	15.44
ii.	Blades complete	234	12.12
iii.	Blades broken	447	23.16
iv.	Microblades complete	5	0.26
v.	Microblades broken	25	1.29
vi.	Flakes	725	37.56
vii.	Chips	196	10.15
	Total	1930	99.99

(a) *Cores* (298: 15.44%) : The cores are classified into three types based on production of flakes, blades or microblades.

(b) Flake cores (145: 7.51%) : The majority of the flake core is amorphous or shapeless and possess irregular flake scars. Many of the cores show exhaustive useage as at hill slope sites like loci III.1, III.2 and IV.1. they form the least proportion at locus II.9, a hill stream site.

(ii) Blade cores (150: 7.77% : among the blade cores the majority is pyramidal in shape and a few are shapeless. Stream and lake side sites show high frequency (23 : 13 : 0.37) of these cores as at locus II.10, highest occurrence (20 : 12.82) is found at hillslope site as at locus III.1

(iii) Microblade cores (3 : 0.15%) : These cores occur in the least proportion. The specimens collected are one each from streamside, hillslope and gorge sites respectively.

(b) Blades (651 : 5.12%) . Blades are the largest artefact group in the total collection. These can be further classified as (i) complete blades, and (ii) broken blades.

(i) Complete blades (234 : 12.12%) : The highest proportion of complete blades occur at hillslope sites (30:23%). A moderate occurrence is found at II.8 a lakeside locus, II.9 a streamside occurrence. Their number is smaller at III.3, a hillslope site. A small proportion of specimens display edge damage.

(ii) Broken blades (447: 23.16%) : The broken blades are characterized by absence of terminal portion (124; 27-74), bulbar region (96: 21.47%) with platform, and (227: 50.78%) both basal and terminal ends. However, the third category retains a large portion of the blade. The number of broken blades are almost double to that of complete blades (23;12.12%). A high occurauce of this type is found at loci III.1, III. 1 and III.2 the hillslope sites.

(c) Microblades (1.30: 1.54%): The microblades also are distinguished into : 1. Complite and 2, Broken types.

Complete micro blades (5: 0.25%) : There are only five specimens in this group. Four of them are from streamside and lakeside, while a single specimen is from a hillslope occurrence.

Broken Microblades (25: 1.29%) : These specimens occur at streamside site as II.9 and lakeside at II.8 and II.10. The least representation is observed from loci III.1 and III. 2, hillstream site.

(c) *Flakes* (725: 37.56%) : Flakes constitute the second largest collection of simple artefacts for the industry. Out of the total a small proportion constitutes the Levellois type. These are distingushed into end struk (417: 57.52%), side struk (148: 20.41%) and intermediate (200: 27.59%).

(A) *Chips* (196: 10.15%) : These are relatively smaller in size. They rarely retain platform and buld.

3. *Others* (5 specimens) : The other types include two stone hammers from locus II.8, one anvil stone from locus II.10 and two bored stones from locus II.9. The fomer two loci are lake side and the latter is a streamside site.

Chronology

Absolute dates are not available either from Tirupati valley or from the adjoining southeast coatal sites. However, a few radiocarbon dates from different parts of India help us to arrive at a relative chronology.

The C-14 date from a post Middle palaeolithic horizon at Nandipalli PRL 24260±600 B.P. is of greater relevance for dating the Upper Palaeolithic industry on the southeast coast. On the basis of this date it can be conjectured that the Upper Palaeolithic in this region should be younger than C. 25,000 B.P.

The Upper Palaeolithic at Muchchatla chintamanu Gavi in the Kurnool district the site adjoining the Tirupati industry shows a TL date 17405 ± 10 B.P. These dates suggest that the Upper Palaeolithic on south-east coast can be bracketed in the range of C. 25000 B.P. to 15,000 B.P. C-14 dates, from other parts of the country also corroborate such a dating.

MESOLITHIC

There are nine mesolithic sites. They are categorised into the following types.

1. Streamside and/or lakeside sites, located at 106 m AMSL, namely loci II.8, II.9 and II.10;

2. Hillslope sites located at 92 m AMSL, namely loci II.1, II.2 and II.3

3. Gorge site. loci IV.1 and

4. Plainland sites located at 92 m AMSL at loci v. 1,2 and 3.

In general, these are located in thorny thicket jungle wiih a grass cover and stretches of barrane rock surfaces. At certain loci as at II.9, these are associated with calcarious sandy loam.

Site categories (1), (2), (3) and (4) mentioned above, and as discussed in the preceding chapter are multi-culture occupations. At some loci of these sites where Upper Palaeolithic scatters are also present, Mesolithic occurs at distinct findspots, in a primary context without any admixture with the Upper Palaeolithic. The diagnositc features of the Mesolithic are the raw meterial, typotechlonogical attributes and size.

The Mesolithic tools are predominantly made on both crystal and milky quartz (1815: 79.02%) with lydianite (95:4.14%) and fine-grained quartzite (387: 16.84%). While in the Upper Palaeolithic, fine-grained quartzite predominates.

Technology

In so far the technology is concerned, the mesolithic tools reveal a well-developed fluted core technology. Predominantly it is point based industry and scraper variants, which made an impressive percentage in Upper Palaeolithic are less common in Mesolithic.

Among the shaped artefacts most of them are made of quartzite (259: 80.43%) at streamside and lakeside sites, lydinite (5: 1.55%) at lakeside and quartzite (58: 18.01%) in the case of hillslope and gorge sites.

The industry is characterized by tools made on micro-blades and to a lesser extent on flakes. The occurrence of blades in diminutive form and the corresponding microblade cores with well-defined fluting suggests indirect punch technique. This practice of punch technique in confirmed by single-sided microblade cores (225: 11.38%), and double sided micro-blade cores (43: 2.17%), also flakes with narrow platform indicate the use of light stone hammer technique. A few flakes with predominent bulb and broad platform suggest a heavy stone hammer technique. Some of these thick flakes were also utilized as cores for further removeal of microblades. The nature of cores and chips at each site clearly shows the method of Blade removal.

Terminology

The classification suggested by Misra *et al* (1978) in made use of

Industry

The industry is divided into three groups : (1) shaped artefacts, (2) Simple artefacts, and (3) others, it comprises a total of 2297 specimens. Shaped : 322 (14.02%), simple : 1975 (85.95%) and 6 specimens fall in the other category. Out of 322 shaped specimens there are blade tools (244 : 75.77%) and flake tools (78: 24.22%)

1. Blade tools

These are of microlithic composition and are made on microblades. Based on the nature and occurrence of retouch on blades, the microliths are classified into 6 groups.

Group	I	Rotouches blades
Group	II	Truncated blades

Group	III	Blunted back blades
Group	IV	Blunted back blades and retouched blades
Group	V	Points
Group	VI	Creacents

Group I : Retouched blades (14: 5.74%): Retouched blades occur in high frequency at locus IV.1. The retouch is conspicious along the lateral margins. Twleve specimens show retouch on both edges while two show on only one side.

Group II : Truncated blades : (9: 3.68%) : These specimens are characterized by a truncation, usually at the distal end, with fine as well as irregular retouch at the truncated end. The specimens at locus V.2 show finer retouch while at II.9 display irregular retouch.

Group III : Blunted back blades (115: 47.14%) : Blunted back blades are distingushed by a steep retouch on one margin of blade to facilitate hafting. The Steep retouch is odserved on single side among a large specimens and on both sides among a few specimens. They accur in high proportion at loci IV.2 and IV.3. Among the total collection, 97(84 35%) show unidirectional blunting and 18 (5.65%) show bidirectional blunting. The occurrence of these artefacts show an increase from hillscope sites through plainland sites.

Group IV : Blunted back and truncated blades (12:4.92%) : These specimens are characterized by the combination of truncation and blunting on one and the same microlithic blade. One lateral margin on 9 (755%) and both the margins on 3(25%) are blunted with truncation. These artefacts occur in 2:1. ration between streamside and lakeside sites. Similarly they occur in 2:1 ration between hillslopes and plainland sites.

Group V : Points (35; 14.34%) : Twentyeight (80%) are on blade and seven (20%) on flake. Points as a whole are

classified as rectilinear points (27: 77.14%) and curvilinear Points (8: 23.85%). These occur in high frequency at locus II.9, a hillstream site and are common at all the hillslope sites.

Group VI : Crescents (59: 24.19%) : Crescents have a convex bluted end and a straight chord. A few of them (12: 20.34%) are symmetric while some (47: 79.66%) are asymmetric.

2. **Flake tools**

The flake tools comprise the following types.

Type	Frequency	Percentage
a. Side Scrapers	58	74.34
b. Denticulates	5	6.42
c. Notches	4	5.13
d. Knives, and	5	6.42
e. Burins	6	7.69
	78	100.00

Side scrapers: (58 :74.34%): Side scrapers comprise both single-sided and double-sided variants. Single-sided variants comprise (i) straight, (ii) concave, (iii) convex, (iv) step and (v) end scrapers. The double-sided scrapers constitute (a) straight (b) concave (c) convex and steep retouch working edges, as shown below.

Type	Working edge	Frequency	Percentage
Single side scrappers			
i. Straight	SS_1 Str	7	15.90
ii. Concave	SS_1 Conc	21	47.73
iii. Convex	SS_1 Conv	14	31.82
iv. Steep	SS_1 Steep	62	4.54
Total		44	99.99

End scrapers (8: 10.25%): The specimens are shaped on blade like flake excepting one specimen. The working edges are found on vertical to the large axis. The lone specimen is made on a tiny blade core. They are :

	Type	Working edge	Frequency	Percentage
i.	One workIng edge straight + other concave	SS_2 Str+conc	3	50.00
ii.	One working edge straight+the other convex	SS_2 Str+conv	2	33.33
iii.	One working edge straight+ other steep	SS_2 conc+conv	1	16.66
	Total		6	9 .99

Among single-side scraper variants the cancave variant (21: 25.93%) occurs in highest frequency. These scrapers occur more in number in locus II.9. The ratio of concave to convex to straight scraper is 3:2:1; steep and end types are found in 1:4 ration.

The double side scrapers are in 3:2:1 rations among straight, convex, and steep types respectively.

(b) Denticulates : (5 : 6.42%) : There are only five specimens of this type. They show 2 to 3 denticulations on one lateral side. These occur at streamside sites (II.9), lakeside sites (II.8) and hillslope sites (III.2).

(c) *Notches* (4: 5.3%) : The notched specimens occur in small number. Out of the four, two specimens occur at streamside (II.9) and one each at hillslope (III.1) and plainland (V.1) sites respectively.

(b) *Flakes* (283: 14.32%): These fall into (i) simple flakes (ii) core-rejuvention flakes and (iii) utilized flakes.

(i) *Simple flakes* (109: 5.52%): These are grouped into end struck (37:1.87%), side struck (22: 1.11%) and indeterminate (50: 2.53%).

(ii) *Core rejuvenation flakes* (48: 2.43%): With the nature of shape of core rejuvenation as the basis, these are classified into straight oblique and top types.

Straight (30: 1.52%): These are charactarized by parallel blade scars on the dorsal surface at right angles to the platform.

Oblique (13: 0.65%): These specimens show only a part of the platform and an oblique scar. These ratin parallel blade scars ranging from large to very small.

Top (5: 0.25%): These are identified by the retention of a major portion of the platform of the core The parallel blade scars usually made at right angle with the surface of the top.

Utilized flakes (126: 6.37%): These specimens are charactarized by the presence of irregular scars on the margin of flakes due to use.

(c) *Blades* (560: 28.33%): Blades are charactarized by parallel and lateral margins. They retain a tiny platform and a prominent bulb indicating they were detached by indirect punch technique. These have a single ridge or two ridges on their dorsal surface. These specimens show triangular and trapezoidal cross-sections respectively. Blades are grouped into complete, broken and utilized.

Complete blades (127: 6.4%): These are blades in their full size.

Broken blades (433: 21.93%): These are broken either at apical or basal or even the middle protion of the specimen. The

breakage could be either by accidental damage or at the time of fabrication.

Utilized blades (111: 5.63%) : These blades are distinguished by use scars on their leteral margins. These scars which indicate edge damage point out that these blades were used as tools for perposing a function.

(d) *Chips* (556: 28.16%) : These are thin tiny splinters. All splinters below 1.5 cm length are classified as chips.

CHRONOLOGY

The Mesolithic industries of the area, other than the one under discussion, include those from Renigunta (Murty, 1970) and Palakonda (Jacob Jaya Raj, 1976, 1978, 1980, 1984, 1985, 1986). The concentration of Mesolithic occurrence is at the riverine streamside and lakeside niches. Isolated Mesolithic occurrences are also present in plainland sites, closer to the Swarnamukhi river.

The Mesolithic industry under discussion is predominantly non-gematric type and on relative chlorological grounds (by comparision with the stratified Mesolithic sites on the southeast coast) fall in early Holocene times, as elsewhere in the country, It has striking similarity with the quartz based mesolithic industries of the southeast coast which, in general are crude when compared to the industries from Adamgarh (Joshi *et al* 1978), ascribed to C. 5000 B.C. Since the industries on the southeast are typotechnologically crude, they could be older than C. 5000 B.C. (say, falling between C. 10000 to 5000 B.C.). Such a dating for the southeast coast Mesolithic may not be unwarranted as there is evidence of Mesolithic dated to C. 8000 B.C. by C14 method in the Ganga valley.

ETHNOGRAPHIC EVIDENCE OF THE YANADIS

Yanadis. a Fisher-Hunter-Gatherer tribe, inhabit the environs in which the stone age sites are located in the valley. Among the ethnic populations, in India according to Eickstedt as cited by Das (1980), the Yanadis are melanid or Black Indian who ethnically form two mixed groups - Southern Melanid and Kolids. The Yanadis under study fall in the latter group. According to Sarkar (1976) Yanadis are distributed in South and Central India, wheseas Risely opines that, they are the true aborigines of India and live in the plains of Southern India. They are distinguished by the following ethnic characters.

Skin colour	Dark to light black
Hair form	Curely to wavy
Hair colour	Black
Hair on body and face	Scanty
Eye colour	Dark brown
Head form	Dolichocephalic
Hasal bridge	Moderately high
Nasal index	Messorrhine
Nasal root	Depressed
Forehead	Slightly sloped
Brow ridges	Inconspicuos
Face form	Narrow with slight prognatism
Lips	Medium to thick
Stature	Short

The origin of the word Yanadi is the subject of much etymological speculation (Thurston 1909). In his view, the

term *Yanadi* is a derivative from *Yanam* which literally means Boat and *Adi* means the most ancient. This could be taken to suggest a close association of the Yanadis with the riverine ecotomes, as these were catamarans and different types of floote for the exploitation of aquatic foods. Interestingly enough, their habitation range is confined to the hinterland riverine basins on the coastal Andhra Pradesh.

According to one version the Sanskrit root, *Anadi* means who origin is not traceable. The word *Anadi* in course of time might have been transformed into *Yanadi* or *Yenadi*, (also spelt by some as *enadi*) and this needs further investigation.

The Yanadis are also believed to be an off-shoot of Chenchu, another food-gathering tribal group inhabiting the Nallamalai hills of the state. There can be little doubt the Chenchu and Yanadis descended from the same stock. Raghavaiah (1974) opines that the process of Chenchu evolving into an Enadi can be seen here : the Chenchu of the Sadasiva-kona changes into Kappala (of frog) Enadi when he first moves down into Kalahasti, or Puttur Plains and gradually merges with the Enadi and becomes one with them. This view is corroborated as the Chenchu and the Yanadi are one and the same, and they intermarry (Ayappan 1948).

Ranga Rao (1901) is of the opinion that, the Yanadis are immigrants from some island or other continent when their ship wrecked and was stranded on the coastal region of Nellore district. In this connection Aiyappan (1948) pointed out that "the most miserable section of this tribe live in the jungles of Pulicat". They do some fishing activity. Basing on such conjecture the Yanadis are treated as migrants from the Malaya Peninsular, Africa or Australia. Even a connection with the Yanam of North California has been suggested.

Whether the Yanadis and the Chenchus are one and the same or not, their original home is supposed to be Sriharikota, an island near Nellore, on south-east coast (Ranga Rao 1901),

As at present the Yanadis are chiefly distributed in the districts of Nellore and Chittoor of Andhra Pradesh and Chengalpet of Tamilnadu; their predominent habitation range being the Kalahasti, the Karvetinagar and the Kambakkam hills and the jungles of Pulicat lake area. The Yanadis under consideration in the study areas are the Adavi type and are still in a transitional stage (Aiyappan 1948)

The above cited observation suggest that the true abode of the Yanadis is in the Eastern ghats, of which the Tirupati valley forms a part.

Subtribes of the Yanadis

The Yanadis are broadly divided into two sub-tribes the Manchi Yanadi and the Challa Yanadi.

Manchi Yanadi

Manchi Yanadi comprises as many as 28 exogamous units who are living within, and in the surrounding of, the valley. They are named af er (1) plants, (2) animals, (3) objects/implements and (4) settlements/hamlets and others. Each of these groups have the following prefixes (eg. Tenkayala Yanadi: named after coconut: Tel. Tenkaya). Thus they have (1.1) Tenkayala (1.2) Thota (1.3) Ellagees (1.4) Chintaputa; of plants, (2.1) Mekala (2.2) Pamula (2 3) Udumula (2.4) Peddapuli (2.5, Chilukala (2.6) Egala/pitta; of animals (3.1) Bandi (3.2) Chenbetti (3.3) Kattula (3.4) Ekala (3.5) Manikela (3.6) Tupakula/bow; of implements (4.1) Intodu (4.2) Illa [India] (4.3) Kanur (4.4) Yellampall (4.5) Adduru (4.6) Nagari (4.7) Desuru and of settlements (5.1) Bojjavari (5.2) Chokkala (5.3) Konda (5.4) Kottal (5.5) Jandyai (5.6) Doddi of others.

Challa Yanadi

These are named after the (1) Nagiri Mekala (2) Elusu (3) Terla setti.

In addition to these, some of the Challa Yanadid are named after the region where they live, certain animals they eat and hunt. These are:

(1) Adavi (2) Kappala (3) Nakkal.

Each of these represents an exogamous unit, which otherwise is called Intiperu.

The following exogamous units are the inhabitants of the valley.

Manchi Yanadi

(1) *Mekala*, (2) *Pemula*, (3) *Udumula*, (4) *Egala*, (5) *Tupakula*, (6) *Yellampdudi*, (7) *Adduru* (8) *Chintaputti*, (9) *Nagiri* (10) *Desuri* and (11) *Konda*. They live close to villages on the outskirts.

Challa Yanadi

(1) *Nagiri mekala*, (2) *Elugu* (3) *Terla Setti* (4) *Adavi* (5) *Kappala* (6) *Nakkala*. They settle away from the caste villages and usually inhabit the foot hill areas of the Palakonda and the Velikondas.

The name of each subtribe carries a specific connotation: In the present context munchi (in Telugu) means good. So those Yanadis who are accepted by caste people to work In domestic services, as agricultural and farm labour and the like are comparatively considered as superior to the other. Hence they consider themselves as "*Manchi Yanadi*". Similarly, those Yanadis who are not accepted for any service by the caste people and who eat dead domestic animals and depend much on the forests for their subsistence are called "*Challa Yanadi*". Challa Yanadis are treated as inferior by Manchi Yanadi in social hierarchy.

Language:

The original language of these people is unknown. They speak a corrupt form of Telugu. However, the expression is of peculiar connotation with elognations of all vowels. Yanadis are known to have their own dialect which they often use to express confidential matters not to be made known to outsiders.

Distribution:

They inhabit the whole of the valley with varying number of huts in each settlement. Moderate to high density of their settlements are located between Tirupati through Yerpedu. The smallest settlement is a solitary conical hut in the foot hills and a moderate settlement has about 15 huts situated either at foot hill or slopes and the largest comprise about 40, situated living close to case villages.

Hut types:

Yanadis, by tradition, used to live in low conical huts, crudely built of bamboos and palmyrah leaves, grass or millet stalks, with a small entrance, through which grown up people have to creep (Thurston 1909).

Yanadis of the study area live in conical huts of 2 m height 1.5 m radium and with erected mud wall of 0.25 m height. At the apex of the conical top of the hut, an empty pot is generally kept inverted to prevent rain water entering the hut. Nowadays, the huts of those living in association with the caste villages are modified and are of squarish or rectangular type, like those of the villagers.

Interior arrangements

Arrangements within a hut are very typical. Immediately at the left side to the extrance, is a shallow hearth dug into the floor facing north northeast (Tel: Agneyamula). They believe that, their gods and goddesses are in the north northeast and the persons who cook the food should face the gods

and goddesses. Adjoining the hearth is kept a water pot and a small drinking vessel which is generally made of the base half of a coconut shell. Next is a row of pots (2 or 3) arranged one upon another for storing grains, edibles and rarely dried meat. In the same way at the right side of the entrance are kept erathnware plates and saucers; they use them even if they are partly broken. Adjacent to these is a rectangular granite slab for grinding chatni. The space left in between these and right side rows is usually occupied by rags and/or a portion of mat made of palymer leaves. A broom stick made of a bunch of small dry plants, has its position near the grinding slab. On the top of the mud wall a lengthy wooden or iron rod which is used as a crowbar is insurted into the roof, besides the fish nets and traps etc.

Settlements

The Yanadi settlement in the valley, irrespective of their location each hut has a boundary made of hedges. But a common boundary of split bamboos or slender canes is built for all the huts of a common exogamous unit. The hut of the headman of the settlement is normally situated in the centre. Aged Yanadis say that, during their grandparental and parental ttmes huts were situated faı off from these of caste people but in due course, due to increased interaction, the socio-cultural distance has become minimised.

Denaity of the settlements

There are 34 Yanadi settlements in the study area. Each settlement consists of a minimum of three or four huts. But solitary hut or a couple of huts are scattered along the foot of the Palakonda and the Velikondas. Concentration of such huts is found in high density near the Komamadugu (clusters of each consisting of two huts) and Avachari kona (5 clusters) gorges. However, settlements like Angimedu, Sitarampet and Yerpedn have upto 40 huts. About 28% of the plainland dwellers and almost all the foot hill and hillslope dwellers are dependent on forest flora fauna, and riverine fish for food.

Subsistance patterns

The Yanadis show a four-fold subsistance pattern such as (1) Gathering (2) Hunting (3) Fishing and (4) Fowling.

1. Cathering

The Yanadis, particularly the Challa Yanadis, gather (1) fruits (2) roots and tubers (3) leaves (4) honey and (5) others. Usually they cxchange the surplus for grains and other commodities and rarely do they sell. The wild plant foods are as follows:

S. No.	Vernacular name	Botanical name	Available
1.	Peddabikki pandlu	*Gardenida gummifera*	Jan./Feb.
2.	Chinnabikki pandlu	*Gardenida latifolia*	Jan./Feb.
3.	Pagadi pandlu	*Mimusops elengi*	Feb./March
4.	Ulindla pandlu	*Diospyros chloroxylon*	Feb./March
5.	Bira pandlu	*Hemicyclia sepiaria*	March/April
6:	Sara pappu	*Buchanania latifolia*	March/April
7.	Usirika	*Pryllanthus officipalis*	March/April/ May
8.	Kondamamidi	*Mangefera indica*	April/May/ June/July
9.	Neeredu pandlu	*Eugenia jambolian*	May/June/July
10.	Elata pandlu	*Phoenix sylvestris*	June/July
11.	Balasa pandlu	*Cauthim diodymum*	July/August/ September
12.	Atti pandlu	*Ficus glamerate*	July/August/ September
13.	Velagapandlu	*Feronia elephana*	August/ September
14.	Paila pandlu	*Mimusops buxifolia*	September & November
15.	Regu pandlu	*Zizypus juguba*	November/ December/ January

S. No.	Vernacular name	Botanical name	Available
16.	Regi pandlu	*Zizypus onoplia*	December/ January/ February
17.	Kalepandlu	*Carissa carindrum*	December/ January/ February
18.	Chinna kalepandlu	*Carissa spinarum*	December/ January/ February

2: Roots and Tubers

1. Injetigadda
2. Adavi yalla gadda
3. Kurella gadda
4. Buchekra gadda
5. Konda bhoram gadda
6. Longeta gadda
7. Gottigadda
8. Itagadda
9. Numamagadda
10. Gitti gadda
11. Cundeti gadda
12. Magasiri gadda

Injeti, adavi yalla and kurella are tubers and resemble sweet potato. They grow and occur in surplus about 0.50 cm underground in scrub jungle of hill slopes. Yanadis dig them out with digging stick (guche karra), boil them in water and eat with salt and occassionally with honey. Snrplus collections are stored for about 3 to 5 months for use in lean times. After boiling the stored tubers taste good as the fresh ones.

Bhuchakra gadda, another tuber grows about 0.5 to 1.0m under the surface, both in the plainlands and the valley and also in the dense forest of the Palakonda and the Velikondas They are abundant in the Konamadugu and Avacharikona gorges. Each tuber weighs more than two kilograms and five grow at a time from a parental tuber. These are a bit hard, so they are sliced, and eaten raw as well as with honey.

Kondabhoram gadda is also a tuber which is common in the forest zones. Generally it is eaten after roasting it and occasionally after boiling in water with salt.

Longitayagadda is more a plainland tuber and grows within a few centimeters below the surface. It grows abundantly in the surroundings of almost all lakes. It is eaten raw. Yanadi children are often seen gathering these tubers and eating them raw.

Gottigadda assumes both bulbar and tuber/root shape. It is plentiful in the swampy areas around ponds and lakes. These grow and cling to the hydrophytic tendrils. They are collected by simply lifting the tendrils. These are eaten with salt after boiling them in water.

Itagadda, grows in open scrub and wood lands usually. The meristem of a tender plant is consumed raw without boiling. This is reported to be nutrious and to increase viguor and vitality.

Leaf vegitable gathered from scrubs

Sl. No.	Name of leaf	Mode of preparation	Mode of consumption
1.	Ponnaganticura	Fried with or without oil	Dry curry
2.	Kalisaku	do	do
3.	Tabelaku	do	do
4.	Payalaku	do	do
5.	Langatyaku	do	do
6.	Neelaku	do	do
7.	Adavi neelaku	do	do
8.	Boddaku	with species added to avoid some pungent adour	do

Honey

Honey collection is one of the important economic activities of the Yanadis, during the months of March and April. They store the quantity required for their consumption and barter the rest for food grains.

Other forest produce

This category includes (i) dry fruits (ii) pods (iii) bark (iv) leaves and (v) flowers. These are mostly sold for cash to the local merchants, belongs to the caste balija setty. These comprise :

S·No.	Vernacular name	Botanical name	Variety of fruit
1.	Karakkai	*Terminalia chebula*	Fruit
2.	Sarapappu	*Buchananai latifolia*	,,
3.	Neredu	*Euginia jambolina*	,,
4.	Kunkudukai	*Sapindus emerginatus*	,,
5.	Mustikai	*Strychnos naxvomika*	,,
6.	Kanugakai	*Pongamia glabara*	,,
7.	Chiliapandlu	*Strychnos potatorum*	,,
8.	Chintakai	*Tamarindus indica*	,,
9.	Seekai	*Acacia concinna*	Pods
10.	Burugakai	*Bombax malabaricum*	,,
11.	Taneduchekka	*Cassia auriculeta*	Bark
12.	Relachekka	*Cassia fistula*	,,
13.	Tookiaakulu	*Diospyros melanoxyln*	Leaves
14.	Tade aakulu	*Bauhinia vahilli*	,,

Of these fruits and pods, many such as *Sapindus, emorginatus, Acacia, concinna, Bambax, malabricum* are used as cleaning agents. They are used either by directly soaking in water and in a powder form, or by mixing in water. Yanadis and even higher castes prefer these natural cleansing agents instead of shampoos. Fruits like *Buchanania latifolia,* are eaten fresh

and are also valued by other castes. Bark and leaves are used in indigenous medicine both by Yanadis and others.

Methods and Techniques of Hunting

The most common method of hunting by a teenager male, or an adult male or even female is by stone pelting. They hunt *Suncus murinus*, *Ratufa indica* by stone pelting method. These species roam in the sorrounding of habitats. Rarely do they escape from the hunter. As the stone pelting involves accuracy in judging the distance and hitting the prey, it is practised only during day-time.

The most common method of hunting is by whirling net. They involve two groups of at least five and three persons each. The large groups goes to locate the animals abode while the smaller lays the net at a predetermined spot. The group that goes to locate the animals, after locating the game, communicates to the other group by a whistle alerting the group and then drive the prey towards the net by beating drums and scaring the animals. They chase the animals, running after them in a semicircle, driving them straight into the net. As the animals approach the net the smaller group waiting on either side of the net also beat the drums and further frighten the animals to ensure that they run into the net and thereby get trapped. This net is called *Khudellaval* (net for harves) since hares are very commonly hunted with this net.

Hunting by *Bisadutta* is another method undertaken by three to five Yanadis in a collective manner. In this method the hunting group locates the shelter of the prey (Porcupine) and makes a trap called *Saarava* procupines live in narrow tunnels or clefts in the hills near Avacharikona, Konamadugu and Yerpedu and this *Saarava* is a trap closing the exist of the tunnel/cleft in which they live. After locating the tunnel/cleft in which porcupines are living, they close the exist with rocks and leave a narrow passage for the animal to escape. Using an clongated stick above the passage about a half a meter interior to the passage another boulder or a slab is hung vertically from

the top so that it may fall and block the passage on even slight touch. From this vertical hanging slab, a small twig called *bisa* is arranged projecting into the passage. When the animal tries to come out, they get trapped in the passage between the two vertical slabs. The Yanadis only have to come to kill and carry away the prey. The prey is usually killed with an iron-tipped stick called *Guchi karra* and the animal is roasted at the spot and taken to their hunts.

Rates are favourite food for the Yanadis. They hunt rates during December-January, the harvest season. The rat hunting is of two types (i) direct and (ii) indirect methods.

i) Direct methods

Usually, only one Yanadi hunts by this method; Rarely does he take supporting help. Here, the rat-holes in paddy fields are located with their expert knowledge. First, the Yanadis with their excellent knowledge of the habits of animals, locate the rat-holes in the paddy fields, that rat-holes are dug along the passage which may extend from a few centimeters to a few meters. It is collected and stored separately. At the dead end of such burrow, one or two adult rates and a few rattins are caught. Their heads are crusned with *Guchikarra* and collected in sack. Only after collecting a sfficient number, they are roasted and taken to hunts. Usually *suncus murinus* and *Gooluda ellioti* are caught by this method. They also collect the paddy corns stored by the rats in their burrows.

ii) Indirect method

After confirming the location of a rat in the burrow, the Yanadi stuffs a pot with hay which is called as *Oodurakunda* (Tel : Oodw; to blow; kunda: pot). This has three holes, one at the base and the other two on sides. Then he keeps burning charcoal on dry dung in the pot and keeps the pot-mouth against the burrow. Another person blows into the pot through the basal hole so that smoke enters the burrow and suffocates the rats. The rats either come out through the other end of

this burrow or die inside. If they come out they get trapped in a net laid for this purpose, if not, the burrow is dug and the dead rates are collected. In this case also stored paddy corn of the rats is collected by Yanadis.

Banda vudata (Tel : Banda : Slab; vudata: squirrel) is a trap for catching squirrles. For this, a stone slab is kept balanced in an inclined position.on a Y shaped peg. Under this slab are thrown grains to attract squirrles. When squirrles disturb the peg while eating the grains, the slab falls and the squirrles get killed under the weight of the slab. These are collected by the Yanadis.

BIG GAME

Big game is almost absent in the foothill zones on the one hand, and on the other, forest laws forbid hunting in the reserved forest. Hence Yanadis rarely indulge in big game hunting. However, they are traditionally proven to have hunted the following:

S.No.	Vernacular name	Zoological name
1:	Kaniti	*Cerves unicolor*
2.	Adavi pandi	*Susscrofa cristatus*
3.	Kondagorra	*Muntiacus munoajak*
4.	Jinka	*Axis axis*
5,	Kondamuchu	*Presbytis entellus*

III. Fishing

Fishing is a cyclic practice in animal routine of the economic activity. As they inhabit the surroundings of hill streams, lakes and riverine ecotomes, they depend predominantly on fishing. They have intimate knowledge of the habits of a variety of fish found in their environs. They have their own dialectual names for various kinds of fish. The following are the different varieties.

List of various names of the fishes

1. Arju 2. Budda (four varieties) 3. Budda jalla 4. Bommi daayi 5. Bonta gandi 6. Banka pitta 7. Burra-jalla 8. Beedisa (Chela Sps) 9. Chitra-gandi 10. Erjeeti-gandi 11. Isuka donta 12. Kondipi 13. Kukkeyitte 14. Kuuri-maayi 15. Koola mukku ceepa 16. Korrameenu 17. Korja 18. Malugu (Angiulla bengalensis) 19. Mulla ragi 20. Muk-ku jalla 21. Muccangi 22. Maanu raagi 23, Moorassayi 24. Naarajalla 25. Olikitatta 26. Paccadaara 27. Pandi gonka 28. Pitrakaasu 29. Sukkupakki 30. Tambaasu 31. Teelujalla 32. Ulasa 33. Vaalagu 34. Vaate jalla.

Fishing zones

Fishing activities are undertaken in seasonal as well as perinnial aquatic zones, The important annual fishing zones are Mallemadugu, Konamadugu and Sitarampeta kona.

Fishing Aids

The important fishing aids are (1) Cast-nets, (2) Traps and (3) Angling rods. *Teppa* the Catamaron is on important fishing aid in the deep lakes.

Fabrication of fishing aids

The cast-nets are fabricated by aged males at leisure. Each person makes his own net. Usually nets are made of cotton threads produced by barter. For net sinkers, cylindrical iron beads as well as bored stones are used.

Trap method

The fishing traps are normally made out of thin and slender bamboo staves. This trap is a rectangular funnel-like device with four or five partitions, with one end open and the other end closed. These partitions have openings on alternative sides. The open end is kept against the flowing current in a stream. Fishes enter the trap, pass through the opening into the partition, and get traped at the rear of the trap. The

Yanadis after three or four hours lift the trap from the water open the rear end and collect the fish. Fish are collected at regular intervals of three or four hours each.

Cast net method

The method involves use of a float made of four to six logs, each having a length of 1.5 m to 2.0 m and a diameter of 10 cm. Each of *Grirotia rottleriforms* Griff; is tied togther lengthwise with a creeper known as "nalla teega". Usually a single individual floats into the deep waters and captures fish by spreading cast-net. This activity is usually undertaken during small hours of the night.

Angling method

The Yanadis are expert anglers. The bait, an earthworm is fixed to the hook. A small float is tied on the line at some point. When the line with the bait is thrown into the water, it submerges upto the float point. When the fish engulf the bait, it gets caught and thereby pulls the line deep. This is indicated by the sinking float. Then the line is gathered in, another bait is fixed to the hook after removing the fish and the process is repeated.

Punuguta

This is a simple and natural method of fishing among the Yanadis in the age group of six to ten years. It is practised usually in shallow and muddy water-streams, lakes and ponds and rarely, in the ditches of cultivated lands. They observe the fish hiding in rock fissures and crevices, or in mud, and very skilfully catch them with bare hands. Small to medium sized fish are caught wiih this method.

Usually they eat fish after boiling. They dry surplus fish in the sun and store it in earthen pots with salt for consumption later. Some, however, roast the fish in fire and eat them as and where they fish. This is usually done by childrens.

Fowling

There are three methods fowling: Cage method, sticky juice method and bow and arrow method.

Cage method: This method is used for catching partridges. The Yanadis first catch a young bird, tames it and keeps it in the cage. This cage is kept in the vicinity of the feeding ground of birds of the same species, and a net is laid. The other birds which respond to the calls of the bird in the cage come close and get cought in the net.

Sticky juice method: Two small veins of jawar or bajra or dried cane are split and the two ends are tied with about 5 cm cotton threads to make the spilt V sqaped. The sticky juice of peepal tree *(Ficus religiosa)* stored in a hollow mammalian horn, and is applied all over the tied V shaped venies. An insect called. *Kummarapurugu* is tied loose at the end of this devise. This is left on the floor near the infloresence of corn. Birds which prey on the insect perch on the stick veins and get stuck to the gummy substance. The Yanadi in wait catches the birds when they get stuck.

Bow and Arrow method

The Yanadis usually shoot wild doves while the latter rest on branches of large trees, such catches are roasted and eaten on the spot.

All thses habits point to say that, the Yanadis under study have deep rooted ancestral affliations with their environs.

DISCUSSION

The area under study is a peneplained country primarily composed of a basement of the pre-cambarian Archean gneisses formed into a crescent shaped valley. There are a series of hill ranges namely, the Seshachalam the Tirupati, the Pala-konda and the Velikonda on west-north-east, and the Sanam-batla, the Nagari and the Srikalahasti on the south-north-east

They generally rise to a height of 1000 m AMSL on the average, receive average annual rainfall of 1000 mm, have a major dry season and the temparatures are cooler on the hills than in the plains. This region slopes down to the southeast, joining the Nellore/Coramandal plains through the intermitent basins of the Nagari hills and through the valley which occupies a fault trough. The vegitation from the hills downto the plains presents woodland, scrub savannah, continuous / discontinuous thorny thicket and scrub facies of the *Albizzia acacia* series and *Hardwiekia pterocarpus anogeissues* series. The riverine eco-systems in the scrub woodland and throny thicket zones on the plateaux fringing the Seshachalam, Tirupati, Palakonda and Velikonda are the favoured habitates of Yanadis.

When we come to the ecosystems, now in the question inference can be drawn on Pleistocene ecology in the study area arises. But we have only the stone age hunter-gatherer sites belonging to the lower middle and upper palaeolithics and mesolithic periods. All these open-air scatters display only the lithic evidence, there is no as yet recorded, archaeozoological (except Jacob Jaya Raj, 1982) and Palaeoethnobotanical eviden-ce to deduce principal guide lines to subsistence behaviour in stone age times Nevertheless there is a striking continuity bitween the habitates of the ethnographic present and stone age sites, which implies that the stone age hunter-gatherer ecosys tems, no matter how vestigial they have now become, continue to support with a traditional hunter-gatherer behavior (Murty 1981).

In the absence of any biological remains associated with these assemblages, the floristic patterns and the faunal life, existing today in the protected forest and game sancturies, pro-vide an excellent key to a generalized reconstruction of the ecology and to a study of human adaptions in the past. Atten-tion has been drawn earlier to the present vegetational types, and according to the concept of *Pleisioclimax* (Gaussen *et al.* 1964) if man and his livestock were to disappear, these physio-graphical zones, including those under cultivation, which have

either no tree cover or have a shrub/thorny thicket facies, would develop into either woodlands or savannah. If this could be so, during Pleistocene and early Holocene times, when there was no real destruction of the flora, the vegetation must have been more extensive and un-interrupted than it is today. In these forested ecotomes, especially in the protected reserves, occur variously all the important game as has been specifled already.

an attempt at presenting a composite picture of the palaeoecology of the Tirupati valley is made here with reference to the evidence as available from Peninsular India, especially from Kurnool limestone caves and the adjoining coastal assemblage.

The late Pleistocene fauan from the Kurnool limestone caves comprises the following species (Lydekkar 1986 :120–122 Murty, 1974, 222-228, 1975: 134-135; 1979: 318-319 Jacob Jaya Raj 1982 from Tirupati valley).

Mummalia

S. No	Zoological name	Common name
1.	*Presbytis entellus Dufrense*	Langur
2.	*Papio*	Baboon

Carnivora

S. No.	Roologieal name	Common name
1.	*Panthera tigris/Panthera leo*	Tigar/Lion
2.	*Pantera pardus*	Leopard
3.	*Felis chaus Guldenstaedt* 1976	Jungle cat
4.	*Felis rubiginosa Geoffroy* 1831	Rusty spotted cat

5.	*Crocuta crocuta Exlbelin* 1777	Spotied hyena
6.	*Viverra kunulieness* (New fossil species) Lydekkar 1886 A	
7.	*Priponodon sp.*	Linsang
8.	*Herpestes edwardsi* Geoffroy 1818	Indian grey mongoose
9.	*Herpestes fuscus* Waterhouse 1838	Indian browy mongoose
10.	*Melursus fluscus*	Sloth bear

Insectivora

1.	*Sorex sp.*	Shrew

Chiroptera

1.	*Tophozons Saccolaimms* temmink 1838	Pouch bearing bat
2.	*Hipposideos diadema*	Large malay leaf nosed bat, not present in India at present.

Rodentia

1.	*Sciurus sp.*	Squirrel
2.	*Tetera indic*	Indian gebril
3.	*Bondicota indcia* Beeshtein 1800	Large dandicoot rat
4.	Bandicota bengalensis	Lesser Bandicoot rat
5.	*Millardia meltada* Gry 1837	Soft spurred field Rat;
6.	*Mus platythrix* Bennett 1832	Indian brown spring mouse
7.	*Gulunda ellitoti* Gray 1837	Indian bush rat

8.	*Hystrix crassidens* (New fossial species Lydekker, 1886a)	
9.	*Atherura Kurnuliensis* (new fossial species Lydekkar, 1886)	
10.	*Lepus nigrocollis* Guvier, 1823	Blacknaped here

Perossodactyle

1.	*Equus assinus* Linn	Ass
2.	*Rhinoceros kurnuliensis* (new fossil species)	

Arteodactyla

1.	*Bos* or *Bubalus* sp	Ox or buffalo
2.	*Boselaphus tragocamelus* Pallas, 1776	Nilgai
3.	*Gazella gezella bennetti* Sylles, 1837	Chnkara
4.	*Antelope cervicapara*	Black buck
5.	*Tetracerus quadricornis* Linn	Four-harned Antelope
6.	*Cervus unicolour* KUr, 1792	Sambar
7.	*Axis axis* Erxleben 1777	Chital
8.	*Muntiacus muntijak* Zimmermann, 1780	Barking deer
9.	*Tragulus meminna* Erxleben 1777	Mouse deer
10.	*Sus scrofa cristatus* Wagner, 1839	Indian wild boar

11. *Sus kurnuliensis* (New fossil sps. Lydekkar 1186a

Amphtia

1. Bufo cf melauostictus schmider

Pholidata

1. *Crocodiles* sp.
2. *Varanus dracaena* shaw
3. *Phyton molurus* Linn
4. *Naia tripudiana* Men
5. *Ptyas mucosus* Linn

Among these, the mammalian species of the order perissodactyla and artiodactyalyla, the herd animals live in perinnial watery area where grasslands and forests are abundant. The occurrence of *Hexaprotodon, palaeindicus* in the northern Deccan and Rhinoceros kurnulensis in Kurnool caves in the southern Deccan during late Pleistocene times point to the presence of perinnial pools and swamps in the riverine, hilly and forested zones (Murty 1979: 318).

Funal remains from the late pleistocene alluvium at Inamgaom in western Maharastra include *Hexaprotodon palacindicus, Equus, namadicus, Elephas* sp. and *Cervus* sp. (Kajale *et al.* 1976! Badam 1979) But today, even though hippopotamus and Rhinoceros are extinct in the Deccan, wild species like Antilopinae and Cervinae survive in the dry deciduous forests in the higher zones of the Seshachalama, Palakonda and Velikonda hill ranges of the study area. The stone age sites under discussion are situated at the foot of these hill ranges specified above. The region today has dry deciduous forest with woodland, savannah woodland, shrub savannah, degraded savannah and discontinuous throny thicket types of vegetation. It is on record that even a few decades ago these forests had a thick vegetation cover and abundant wild life. Even today these forests provide ample food resources such as terrestrial, arboreal, acquatic funa and wild plant food for the living hunter-gatherers.

The prolific occurrence of Palaeolithic and mesolithic sites in the Tirupati valley indicate that this region was an ideal habitation during Pleistocene and Early Holocene times. By drawing parallels from the Yanadis the fisher-hunter-gatherers who exploit the ecotomes in which the stone age sites are situated, the following predictive models for the stone age subsistence strategies can be suggested.

Lower Palaeolithic

The distribution of Acheulian occurences is dense in the foothill, streamside and lakeside niches of the Tirupati valley.

A metrical analysis of the handaxes of the Acheulian shown in the form of shape diagrams (following Roe 1964, 1968, 1976) reveal the distribution of handaxe assemblage.

A Significant feature that can be seen from the shape diagram is that are characterized by elongated handaxes, the streamside and/or lakeside sites by ovates and elongated implements, while those of the hillslope sites by mostly pointed tools.

From the topographical location it can be seen that these Acheulian populations lived along hillstreams, nullahs, braided runnels and lakes very close (0.25 km to 1 km) to the main channel of the river. Such locations suggest dry seasion encampment geared to an exploitation of different environmental niche within the site catchment area.

The Acheullian of the study comprises choppers, hands axes, cleavers, flake knives, large retouched flake scrapers, and flakes showing edge damage. Of all these objectively, it is only the handaxes - the pointed ovate, triangulate, lanceolate, with symmetrical outlines, thin cross sections, straight profiles and tapering butts - which can be regarded as the hunting tools, possibly mounted in hafts as spearheads. Hunting game with spears involves direct frontal attacks or stalking the animals by immobilizing it : by driving it down a steep cliff, a river terrace, or into a swamp. This sort of hunt requires the cooperation of

a large groups, and stalked. The chances are against cornering and stalking agile game, the species belonging to cervinae and antilopinae. Possibly, but not necessarily, animals like *Bos* sp. *Bubalus* sp. and *Elephas* sp. might have been cornered with some effort.

If obtaining food by killing game was the major tradition during the lower palaeolithic, then there must first have been a high percentage of artefacts that could be used as a direct hunting aids, like spears. Secondly, one would expect a concentration of Acheulian occurences in the outliers of woodland savannah and gallery forest, which are the favourites habitat of such big game. The absence, infact, of either of evidence makes it unlikely that the hunting of big game was a successful strategy for the Acheulian groups. Consequently, there must have been greater reliance on Yams, tubers, roots and other wild plant foods; as said already, these continue to be a tradition in these tribal areas. Moreover as Clark (1967) has shown, some handaxes could well have been used as digging tools, while the other sharp-edged flake tools were used for making wooden implements. That apart, there must be some strong reason, ecological or otherwise, for the general concentration of Acheulian scatters in what appear to be the riverine zones of the study area. And it could be that the Acheulian groups in the hinterland and littoral environments were dependent as mush on aquatic food sources like fish, crab, turtle etc., as on vegetable foods for their animals fat and protein requirements. Occurrences, together, of certain tool classes, like heavy flake knives, plain flakes with heavy butt ovate sharp with cutting edges, symmetrical, dorsoventrally flattened scrapers with thin cross rectiam and sharp edges near waters, from what might well suggest that it was a locus where slicing, cutting and processing of fish foods such as the varieties of *Wallago attu*, *Begarirus*, *yarrellii*, *Macronas*, *cavasius* etc., which range in length from 90 cm, to 2 m was carried out. Some of these cutting tools were probably used in wood working for making wooden fishing spears, while it is very likely that some of the massive and heavy butted handaxes could have been used

in cutting the woods of littoral species like *Thespesia, populnea soland, Calophyllum, inophyllum* L.,

Middle Palaelithic

The evidence for the Middle Palaeolithic in the Tirupati valley is from the streamside and lakeside sites. These sites are widely distributed between Renigunta–Yerpedu. A total of 12 sites from Rallakalava area and 15 sites of the present study forms the basis of Middle Palaeolithic. The tool types include various types of scrapers, notches, denticulates and miniature handaxes. The occurrence of bifaces, though in small proportion and the use of mostly medium grained quartzite as raw material indicate the persistence of late Acheulian tradition. The miniature handaxes could have been hafted as spear.

A large number of scrapers both from surface and excat vation are concave scrapers, notches and denticulates. Many of the scrapers, especially the concave type, notches and denticulates collected from streamside and lakeside sites are showing edge damage, were probably used for working on wood, bone and hide. As all the sites of the middle palaeolithic are situated in the same environmental setting as that of the Acheulian, they indicate continuity in occupation and exploitatin of the same niches.

Food procurement strategies in the middle Palaeolithic may also has been oriented with emphasis on vegetable and aquatic foods, and the middle palaeolithic tool kit suggets the possibility of manufacture of better hunting aids. Although well-defined artefact forms like typical arrow points tanged arrow heads, unifacial and bifacial points, which can be regarded as having been certainly used in making hunting equipment are rare, there is a variety of flake tools, especially scraper variants like side, concave, convex, end, notches and denticulates and large utilized flakes, which are likely to be associated with wood and bone working in making hunting aids like wooden spears, fishing spears, bows and arrows, and foraging aids like digging sticks. It can be postulated that while son e

of the unifacial points, bifacial points and Levallois flakes could have been mounted as arrow tips, arrows made just of wood from end to end, which are used even today by agricultural tribes in the Godavari valley like the Gonds, must have come into vogue by the middle palaeolithic. It can be conjectured that from middle palaeolithic times, along with the exploitation of aquatic resources and foraging of wild plant foods, hunting big and small game must also have become an important economic activity: The dispersal of several middle palaeolithic occurrences in non-riverine savannah woodland/shrub savannah/open or closed thorny thicket zones where Acheulian is absent in the area between Renigunta – Yerped – Karakamedi – Vadamalapet lands, supports such reasoning.

Upper palaeolithic

The evidence for Upper Palaeolithic is found at Rallakalava (Murty 1966, 1969, 1970), Isukakalava streams and lakeside sites and also hill slopes (Jacob Jaya Raj 19'8, 1979, 1980, 1981, 1984, 1985, 1986). These Upper Palaeolithic sites show very high density of artefacts while the hillslope sites are characterized by scatters of Upper Palaeolithic artefacts over kilometers between Yerpedu and Government Leprosy centre. The present industry comprises predominantly blad scrapers, a majority of them concave type, followed by backed blades and burins. The industry of the Renigunta area is characterized by blades and burins, whereas Gunjana industry is predominantly by backed balde and scraper variants. Thus when Tirupati – Renigunta – Gunajana industries are observed, they represent one habitational zone with common technological aspects but with minor variations in frequency of typological contents.

The Upper Palaeolithic of Tirupati valley shows that occupational sites are situated close to permanent water sources like hillstreams, gorgees and the like. The raw materials for tool manufacture are in plenty in the form of pebbles and nodules throughout the study areas. Particularly at gorge and hillslope sites, the raw material is fine – grained olive green

quartzite exclusively, whereas among stream and lakeside sites medium-grained quartzite also from a part of the raw material. This suggests the persistence of middle palaeolithic medium-grained quartzite in the case of stream and lakeside sites, whereas it is fine grained at the others. The sites are located at the most convenient places with easy access to perinnial water sources and the foraging zones in the Gorges.

The Upper Palaeolithic indicates a further stride in hunting technology and strategies. The spatial distribution of Upper Palaeolithic scatters indicate a continuity in the riverine hinterland and littoral adaptations and penetration into the woodland forests of *Hardwickis pterocarpus anogeissus* series. With the development of blade tool technology, the Upper Palaeolithic hunter-gatherers were able to exploit agile game like *Cervus unicolor* (Kerr), *Axis axis* (Erxleben) *Antilope cervicapra* (Linn), *Muntiacus muntijak*, *Golunda ellioti* (Gray), *Hystrix indica* (Kerr), *Lepus nigricollis* etc., as well as big game like ox/buffalo. The blade tool assembleges are marked by a poor representation of backed points while simple, pointed and parallel sided blades, a few retouched blades, scraper variants are most common.

In the hinterland balde industries and burin industries, in addition to the above types, there is an element of backed points both curve back and straight back, other tools like huge backed knives, backed pieces as big as a segment of an orange recalling the Australian culture, prismatic core scrapers, burins, and horsehoof cores reminiscent of Australian counterparts. As shown by Mulvaney (1969), Misra (1974), Clark (1976) and Murty (1986), these simple blades and backed blades could have been used as inserts for spear points, arrow points, fishing arrows, barbed fish hooks, harpoons, thrusting spears, slicer knives and daggers. It is possible that some of the broad flake blades and large pointed blades could have been fixed into a resin or into a wooden handle recalling the Australian scrapers, a majority of them concave type, followed by backed blades and burins. The industry of the Renigunta area is characterized by

several species of *Acacia* and the milky juice of *Excoecaria aqallocha* (Linn), which harden on exposure to air into a black gum-like subtance, might have been used for hafting purposes. Not all the backed point variants, especially, the thick ones with sector like cross sections, could have been used as inserts for composite implements, in all probability, these could have been used as small pen-knives for cutting of the scrplus cordage and tips of knots in the binding, and interlacing of various strands of thin cord into a network for making fishing nets. The first association of such thick backed points with the Upper Palaeolithic in the inland riverine sites lends support to such a view. In this context, the bored stones associated with the Upper Palaeolithic locus II.9, Isukakalava, which are not heavy enough to have been either maceheads or weights for digging sticks, were probably used as net-sinkers. Nets, once developed as fishing aids, could also have been used as a trapping mechanism for other game as can be attested to by the use of few types of net traps by the Yerukalas in the Kurnool cave areas.

Mesolithic

Evidence for the Mesolithic, is found at Renigunta and in thesurrounding streamside and lakeside sites, hillslopegorge sites and isolated plainland sites (Jacob Jaya Raj 1978, 1980, 1981).

The occurrence of fine grained quartzite of olivergreen colour in the Mesolithic and the diminutive form of microlithic blades, strongly suggest on their deep-rooted raw material typology and technologcial similarity with the Upper Palaeolithic culture as observed from hill slopes and gorge sites. In the case of streamside and lakeside sites, in addition to a minor occurrence of fine grained quartzite, the industry is dominated by quartz, crystal and milky quartz and by lydianite. But in the case of plainland sites the microlithic artefacts are exclusively made of crystal and milky quartz. Moreover all the plainland sites are closer to the main channel of the river. These factors clearly suggest that mesolithic technology has its roots in the Upper Palaeolithic itself.

were eaten together to make the diet palatable. The Yanadis eat several tubers of Dioscroea sp. like *Oppsotifolia, bulbifera, Pentaphylla* and *sylvatic* along with honey. Such dietary might have a long established antiquity.

It may be suggested that broad similarities in subsistence adaptations in the study areas, from stone age times to the ethnographic present, can be predicted on the basis of ethnogra phic analogy, in combination with archaeological reasoning and environmental reality. It is hypothesized that Yanadis can in fact, be seen the ontogenic survivals from the stone age past.

SUMMARY AND CONCLUSIONS

The Tirupati Valley in Chittoor district of Andhra Pradesh lies between 13°30' and 13°45' N latitude and 79°16' and 79°45' E longitude and covers an area of 800 sq. km. It is encircled on nothern and western borders by hill ranges called the Seshachalam or Palakonda, (popularly known as the Tirupati hills) and the Velikondas respectively. The Sanambatla; the Nagari and the Srikalahasti ranges extend from the eastern to the northern border. The valley is drained by the Swarnamukhi and its tributaries the Kalyani, the Konamadugu, the Rallakalava, the Isukakalava and several other hillstreams. There are as many as 136 lakes and a network of perinnial spring and seasonal falls. The vegetation of the valley belongs to dry deciduous scrub savannah and trophical thorny types. The mean annual rainfall and temperature are 837 mm and 36.50°C respectively.

Previous archeological investigations in Chittoor district had brought to light stone age occupations - both surface and stratified - belonging to Lower, Middle and Upper Palaeolithic and mesolithic cultures. The raw meterials use for the assemblages of these cultures are coarse to medium grained quartzite for the Lower Palaeolithic, coarse to fine grained quartzite for the Middle Palaeolithic and fine grained quartzite and to some extent lydianite for the Upper Palaeolithic and Epipalaeolithic. The mesolithic assemblages are predominently on quartz, which is also the chief raw meterial at several sites elsewhere on the southeast cost of India. The evidence from the Tirupati valley corroborates these earlier observations.

The object of the present study is an understanding of the primary surfacial Palaeolithic and Mesolithic occupations in the Tirupati valley. Sixteen Lower Palaeolithic, II Middle Paleolithic, 3 Upper Palealithic, 2 Epipalaeolithic and 5 Mesolithic occurrences have been located by the author, To ascertain the stratigraphic position of the industries small excavation was conducted at Sitarampet, a Lower and Middle Palaeolithic workshop-cum-habitation site.

The Lower Palaeolithic occupation occures in avaried topographical settings: the foothill zones (now) degraded woodlands and in the vicinity of natural ponds, lakesides and streamsides, and on the low plateaux a scrub and thorny thicket cover.

The Lower Palaeolitoic is represented at 18 loci and 22 scatters by 2300 (23.34%) specimens. These are classified as shaped (537: 23.34%) and simple (1763: 76.65%) artefacts. The shaped artefacts comprise handaxes (70-10%), cleavers. (6.33%), choppers (8.00%), pick (1.30%), side scrapers (11.35%) and endscrapers (2.97%). The simple artefacts are, cores (10.55%), flakes (89.45%) and stone hammers (7) which are not included within the frequency and percentages. The raw material is coarse to medium-grained quartzite, which is abundantly available in the form of pebbles and nodules in river and stream beds as well as in quartzite outcrops. The tools are basically worked with cylinder hammer, have summetrical outlines, straight profiles and biconvex to lenticular cross sections. Majority of the handaxes are oval shaped and some of them are pointed with sharp cutting edge all over the periphery. Thin butts were probably mean to facilitate the hafting of handaxes as spearheads, pointed tips but thick pebble butts were probably used for digging roots and tubers. Technologically the Achelian industry of the Tirupati Velley is more advanced than the industries of Chirki-Nevasa and Hunsgi and can be ascribed to the Late Acheulian of the Tirupati-Renigunta Gunajana-Complex.

Metrical analysis of handaxes from eight loci suggests two distinct Acheulian classes : The first one has a predominance of oval-shaped handaxes with cutting edges all around periphery and is represented by Lakeside and streamside sites. The second category is distinguished by both oval shaped handaxes and implements with heavy butts and broad working ends, and is represented at foothill sites. These two classes are suggestive of different activities as they come from sites in two different microenvironmental niches, reflecting the modes of exploitation and procurement of plant and meat foods.

The middle Palaeolithic occurrences belong to II loci and 15 clusters and amount for 1471 specimens. These are classified as shaped (362: 24.61%) and simple (1109: 75.39%) artefacts. The shaped artefacts comprise miniaure handaxes (1.63%), cleavers (0.40%), side scrapers (14.62%), denticulates (1 76%), end scrapers (0.88%), end-cum-side scrapers (0,631%), notches (0.67%), points (0.33%), borers (0.67%). The simple artefacts are flakes (54.53%) and chips (11.09%). The flake blanks are produced from prepared corse (9.80%) with or without faceted platform as well as from simple cores. Miniature handaxes and points on cores reveal thin and shallow scars and bifacial retouch, suggesting the continuity of Late Acheulian bifacial techniques in a refined form. The Middle Palaeolithic industry in the Tirupati valley displays close affinities to quartzite based industries in different river basins of the southeast coast like the Sagileru, the Penner, the Gunjana, the Palery and the Gundlakamma.

The evidence for the Upper Palaeolithic and Epipalaeolithic comes from five loci and 13 scatters. The industry comprises 2342 specimens which includes (412: 15.59%) shaped and (1930: 82.41%) simple artefacts. The shaped artefacts include ninetypes, side scrapers (41.09%), denticulates (2.18%), notches (5.82%), knives (24.25%), back blades (9.45%), crescent (17.03%) burins (7.76%), borers (0.97%) and pointed blades (1.45%) The

simple artefacts are cores (15.44%), blades (33.38%), which includes complete blades (12.12%) and broken blades (23.16%) and miaroblades (1.54%) which also include complete type (0.25%) and broken type (1.29%) and flakes (37.56%) and chips (10.15%) The industry is based on blade tool technology and consists predominantly of scrapers and backed variants made on fine-grained quartzite and lydianite.

Various types of scrapers are likely to have been used for processing wood, hid and bone for making hafts and wooden implements. The backed types were probably used as composite tools - for barbed arrowheads, harpoons, slicer knives and inserts for fish hooks. The predominance of backed points in the Upper Palaeolithic, viewed in the content of central Indian Mesolithic rock paintings, corrobrates the above mentioned observation.

The evidence for Mesolithic comes from five loci and 14 scatters. These are located in the hill slopes as well the plains of the valley and are close to the Swarnamukhi than the sites of various Palaeolithic cultures. They occur on patches of uncultivated land in the thorny thicket jungle with grass cover on stretches of barren rock surfaces.

The industry comprises a total of 2297 specimens of which 322 (14 32%) are shaped tools and 1975 (85.98%) are simple artefacts. The shaped artefacts of microliths include retouched blades (5.74%), truncated blades(3.68%), blunted back blades(47 14%), blunted and oblique retouched blades (4.92%), points (14.34%), and crescents (24.17%). Similarly shaped tools on flakes include single side scraper (56.40%), double side scraper (7.69%) and scraper (10.25%), denticulate (7.42%), notch (5.13%), knife (6.42%), burin (7.69%). The simple artefacts include cores (23.53%), flakes (14.31%), blades (33.99%) and chips (28.16%).

The Mesolithic industry is predominantly of nongeometric type and it is strikingly similar to the quartz microlithic industries of the southeast coast.

A study the of life way of the Yanadi gather-hudter fisher people inhabiting the Tirupati valley, very often on the same sites as those occupied by Upper Palaeolithic and Mesolithic groups was undertaken to get an insight into the prehistoric subsistence and adaptation patterns. The Yanadis of the Tirupati valley were, until recently, pure hunter-gatherers but now many adapt as manual labourers, and watchmen in the fields of agriculturists. Traditionally the Yanadis lived in bands of 1 to 5 and 10 to 20 families in rather haphazard settlements of circular huts with conical roofs made entirely of plant meterials. Such huts are still built and are generally 3 to 4 m in diameter with a wall of 0.5 m height. Entrance are very small, 1.0 m high, 0.95 m wide and are closed by doors of leaves and twigs.

The Yanadis have expert knowledge of their ecology. They are intimately familiar with all animals, birds. fish, and useful plants in their habitat and these play an important role in their subsistence. The Yanadi hunting expedition consists of 3 to 12 persons. They traverse the forest up to 20 km and stay away from their habitations for three days when out hunting. They erect small, temporary huts for shelter in the forest or use caves and rock shelters wherever they are available. When a kill is made, a portion of it is cooked and eaten on the spot, and the rest is sun dried on rocks and taken back home for later use together with bones, horns and antlers required for other purposes. Quartz and quartzite flakes are also used, though occasionally for butchering.

They hunt at least 14 species of game with snares, nets and other methods. The game includes hare, lizard, squirrel, porcupine, wildcat rat, bandicoot and lagur monkey. They catch at least 45 species of fresh water fish by as many as 12 methods using fish traps, wire, nets, hooks and poisions.

They can identify 68 species of birds, of which 6 are regularly caught by using nets, snares and cages. They consume atleast 12 species of yams, wild roots and tubers, 8 leafy greens

and 27 speoies of edible fruits. They collect 19 items of minor forest produce, use part of these for their subsistence and exchange the rest with farmers for grain or cash.

It is interesting to note that the various local names of the flora and fauna and the uses of different items as food and for medicine, are known only to the Yanadis and not to any of the advanced agrlcultural communities in the area. This intimate and wide knowledge and extensive exploitation of wild plants and animals for food and medicine on the part of the Yanadi shows that it must have been a long tradition. The physical correspondence between Upper Palaeolithic settlement and Yanadi settlements is too close to be purely concidental. On the contrary, it strongly indicates that the present Yanad could be bio-cultural descendants of stone age hunter-gatherers and that the exploitation and adaptation patterns of the Yanadi provide excellent analogies for predicting the lifeways during at least Upper Palaeolithic and Mesoliihic times.